Ontario
Executive Council

Order in Council

On the recommendation of the undersigned, the Lieutenant Governor, by and with the advice and concurrence of the Executive Council, orders that

the appended document entitled "Province of Ontario Nuclear Emergency Plan" be adopted as an emergency plan respecting emergencies arising in connection with nuclear facilities formulated under section 8 of the Emergency Plans Act, 1983, being chapter 30.

Recommended Ken Keyes
Solicitor General

Concurred Elinor Caplan
Chairman

Approved
and Ordered June 12, 1986
Date

Administrator of the Government

O.C1618/86

FOREWORD

The Province of Ontario Nuclear Emergency Plan has been developed pursuant to Section 8 of the Emergency Plans Act, 1983. This plan replaces the Province of Ontario Nuclear Contingency Off-Site Plan (June 1980) which is no longer applicable. Holders of copies of the old plan are advised to destroy them.

Numbered copies of the various parts of this new plan are distributed according to the Distribution List appended to the Part I plan. Holders of these numbered copies are responsible for keeping them updated by incorporating numbered amendments, which will be issued from time to time.

Additional copies of the parts of the Nuclear Emergency Plan are available, for official use, from Emergency Planning Ontario, and for others, in Toronto, at:

Government of Ontario Bookstore
Main Floor, 880 Bay Street

(416) 965-2054

or, from outside Toronto, through:

Ministry of Government Services
Mail Order Service
5th Floor, 880 Bay Street
Toronto, Ontario
M7A 1N8

(416) 965-6015
Toll-free: 1-800-268-7540

This plan is administered by the Solicitor General of Ontario. All comments and suggestions relating to it should be directed to:

Ministry of the Solicitor General
Emergency Planning Ontario
1st Floor, 25 Grosvenor Street
Toronto, Ontario
M7A 1Y6

(416) 965-6708

Copies of the plan have been made available to the relevant area public libraries for the information of the public. A copy of the plan is also available to the public for inspection and copying during ordinary business hours at the offices of Emergency Planning Ontario at the above address.

PROVINCIAL NUCLEAR EMERGENCY PLAN

AMENDMENTS

PART OF PLAN	AMENDMENT NUMBER	DATE OF AMENDMENT	DATE ENTERED	AMENDMENTS MADE BY (SIGNATURE)

Note: It is intended for this plan to be placed in a 4-ring looseleaf binder to facilitate the inclusion of changes as they occur. When a change or addition is made to the plan, those parties holding numbered copies of the plan will receive the revised pages or additions. The amendment number is found at the lower right corner of each page. The date of the change is found below it. The person entering the new pages into the plan should fill out the form above for each series of amendments that are received.

PROVINCE OF ONTARIO

NUCLEAR EMERGENCY PLAN

PART I - PROVINCIAL MASTER PLAN

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PROVINCE OF ONTARIO

NUCLEAR EMERGENCY PLAN

PART I - PROVINCIAL MASTER PLAN

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OVERVIEW : PROVINCIAL NUCLEAR EMERGENCY PLAN

Although extensive protective and safety systems are installed at nuclear power facilities to minimize the chance of a major accident, the Province of Ontario has prepared a comprehensive plan to protect public health and safety in the event of a nuclear emergency. This plan is divided into several parts, comprising a master plan and subsidiary plans for each nuclear facility. How the plan is intended to work is outlined below.

Initially, the nuclear facility notifies Provincial and municipal authorities that an offsite emergency exists, and makes recommendations for protective measures to municipal authorities. The municipalities are authorized to declare an emergency, warn the public and to take appropriate protective measures based on these recommendations.

A Provincial Operations Centre (OpsCentre) is set up as soon as possible to take over operational control and direct activities, including the over-all responsibility for disseminating information on the emergency through a Provincial Information Centre.

Operations are carried out in two phases:

Phase 1: The emergency phase in which urgent action may be necessary, initially by the municipality on the advice of the nuclear facility, and then by the Province. The OpsCentre receives a steady flow of information from the nuclear facility, meteorologists, reactor safety specialists and radiological survey teams. Based on such data, decisions are made on protective measures and communicated to the affected municipalities and the public. The measures are implemented by the municipalities with the assistance of police forces, social services personnel, and other municipal departments.

Phase 2: The ingestion control and restoration phase. When the OpsCentre declares that the first phase has been completed, attention focuses on possible contamination of the food chain. Monitoring teams sample food and water supplies and, if necessary, measures are taken to restrict consumption. Meanwhile, efforts begin to restore conditions to normal in the affected area.

When appropriate, the Province will declare that the emergency has been terminated, and assessments will be made of property damage and losses, if any, for payment of compensation.

A thorough understanding of the details of the Provincial Plan for nuclear emergencies is essential for its success. Officials and planners from Provincial departments and agencies, municipalities and nuclear facilities are urged to carefully study the plan so that they are well prepared to fulfill their responsibilities if a nuclear emergency occurs in Ontario.

ACRONYMS & ABBREVIATIONS

AECB - Atomic Energy Control Board

AECL - Atomic Energy of Canada Limited

BNGS - Bruce Nuclear Generating Station

BNPD - Bruce Nuclear Power Development

CANDU - the name of the Canadian developed nuclear power reactor system (from Canada Deuterium Uranium)

CEPO - Coordinator, Emergency Planning Ontario

COMSONT - Communications Ontario (an amateur radio organization)

CRNL - Chalk River Nuclear Laboratories

DeconCentre - Decontamination Centre

DEL - Derived Emission Limit

DRL - Derived Release Limit

ECC - Exposure Control Centre

EPO - Emergency Planning Ontario

ExecGroup - Executive-Advisory Group

FHQ - Field Headquarters

FNECC - Federal Nuclear Emergency Control Centre

InfoCentre - Information Centre

InfoGroup - Information Group

IMO - Ingestion Monitoring Organization

IMCG - Ingestion Monitoring Control Group

JTCC - Joint Traffic Control Centre

KI - Potassium Iodide

km - Kilometer

LOCA - Loss-of-Coolant Accident

MCG - Municipal Control Group

MCSS - Ministry of Community & Social Services

Met - Meteorology, meteorological

MNR - Ministry of Natural Resources

MOE - Ministry of the Environment

MOH - Ministry of Health

MOL - Ministry of Labour

MSG - Ministry of the Solicitor General

MTC - Ministry of Transportation & Communications

NPD-NGS - Nuclear Power Demonstration - Nuclear Generating Station (the nuclear facility at Rolphton)

OH - Ontario Hydro

OMAF - Ontario Ministry of Agriculture and Food

OpsCentre - Operations Centre

OpsGroup - Operations Group

PAL - Protective Action Level

PNGS - Pickering Nuclear Generating Station

PTAC - Phase 2 Advisory Committee

rad - See definition of Absorbed Dose in Glossary

rem - See definition of Dose Equivalent in Glossary

SOPs - Standard Operating Procedures

TAS - Technical Assessment Section

TechGroup - Technical Group

Telecom - Telecommunications

TLD - Thermoluminescent Dosimeter

TSS - Technical Support Section

CHAPTER 1

GENERAL

1.1 Aim of Planning

1.1.1 The aim of the Province of Ontario, in the event of a nuclear emergency, is to safeguard the health, safety and well-being of the inhabitants of the Province, and to protect their property.

1.1.2 The Province's Nuclear Emergency Plan provides the basis upon which nuclear emergency planning, preparation and implementation shall be undertaken to achieve the above objective.

1.1.3 Nuclear emergency plans formulated by municipalities, nuclear facility operators, and other agencies and organizations shall conform to the Province's Nuclear Emergency Plan.

1.2 Structure of the Plan

1.2.1 The Province's Nuclear Emergency Plan comprises several parts. Part I is the Provincial Master Plan. Parts II to VII contain site-specific plans for emergencies caused at individual nuclear facilities. Part VIII deals with emergencies caused by trans-border nuclear facilities which pose a limited danger to Ontario. A list of the parts of the plan is given in Appendix 1 (page 48).

1.2.2 Provincial Master Plan

The scheme of this part of the nuclear emergency plan is described below:

(a) Chapter 1 defines aims, legal bases and guiding principles.

(b) Chapter 2 discusses the planning basis and concepts used to develop the plan.

(c) Chapter 3 deals with the planning and preparation necessary to ensure adequate preparedness to cope with a nuclear emergency.

(d) Chapter 4 covers the organization required to deal with an emergency.

(e) Chapter 5 identifies the operational responsibilities.

(f) Chapter 6 prescribes the operational policy to be observed in implementing the plan.

1.3 Scope of Various Plans

1.3.1 Nuclear Emergency

A nuclear emergency, in the context of this plan, is an emergency at a nuclear facility which poses a radiation hazard to people or property offsite.

1.3.2 Applicability

While the general provisions of this plan are applicable to all nuclear facilities in Ontario and all Ontario municipalities likely to be affected by a nuclear emergency, its specific and detailed provisions apply only to the following among them:

(a) Designated Nuclear Facilities and their Operators. These facilities are listed in Appendix 2 (page 49).

(b) Designated Municipalities. These are also listed in Appendix 2.

(c) The provisions of Part VIII of the plan (Trans-border Nuclear Emergency Plan) apply to the nuclear facilities and municipalities specified therein.

1.3.3 Provincial Master Plan

This plan lays down the principles, concepts, organization, responsibilities, policy, functions and inter-relationships which will govern all nuclear emergency planning, preparation and response in Ontario.

1.3.4 Site-Specific Plans

These parts of the Nuclear Emergency Plan deal with the planning for an emergency at a particular nuclear facility. They are designed to be read and applied in conjunction with the Master Plan, and hence minimize repetition of matters contained in that document. However, they do deal in more detail with certain topics mentioned in the Master Plan.

1.3.5 Transborder Plan

Part VIII of the Nuclear Emergency Plan deals with a nuclear emergency caused by any nuclear accident occurring outside Ontario, including one at a number of specified nuclear facilities in the U.S.A. These are combined in one document since many of the features will be the same for all such potential emergencies.

1.3.6 Municipal Plans

Nuclear emergency plans prepared by designated municipalities shall conform to and be based upon the Provincial plan. They shall cover the municipal organization, responsibilities and functions, plans and procedures required to deal with a nuclear emergency and to implement any protective measure in any response sector within the municipality. (Guidelines on implementation are given in Appendix 7, page 63).

1.3.7 Nuclear Facility Plans

The emergency plans and procedures of nuclear facilities deal with their onsite responsibilities. They shall also include the measures required to discharge offsite responsibilities assigned to them in the Provincial Nuclear Emergency Plan.

1.3.8 Ministry/Agency Plans

Provincial ministries and agencies assigned certain responsibilities and functions under the Provincial plan shall, where appropriate, develop their own plans and procedures to fulfill their responsibilities. Such plans shall be site-specific and detailed.

1.4 Legal Basis and Powers

1.4.1 The legal basis for emergency planning and response in Ontario is the Emergency Plans Act, 1983. Those portions of the Act which are relevant to nuclear emergencies are reproduced in Appendix 10 (page 106).

1.4.2 The Provincial Nuclear Emergency Plan is promulgated by the Lieutenant Governor in Council under section 8 of the Act.

1.4.3 Other acts which may be used in a nuclear emergency are identified in Appendices 11, 12 and 13 (pages 109, 114 and 116).

1.4.4 The emergency powers conferred upon the Premier of Ontario by section 7(2) of the Emergency Plans Act, 1983, may be delegated by him to a Minister of the Crown. In case of a nuclear emergency, that Minister will normally be the Solicitor General of Ontario.

1.4.5 The emergency powers of the Premier of Ontario or the minister designated under section 7(5) will, in a nuclear emergency, be exercised through the Provincial Operations Centre or other designated bodies. Directives issued by these bodies shall be deemed to originate from the Premier or designated minister.

1.4.6 Crown employees are hereby authorized to take action to implement the Province's Nuclear Emergency Plan where such action is considered necessary, even though the declaration of the existence of an emergency has not yet been made under the Emergency Plans Act, 1983 (Section 9(a) of the Act refers).

1.4.7 Compensation for injury or damage caused by a nuclear incident, as defined in the Nuclear Liability Act, would be assessed and paid under the provisions of that Act, which is a Federal statute.

1.4.8 Any person who is injured while assisting in dealing with a declared municipal or Provincial emergency would be covered by the Workers' Compensation Act. A relevant extract from the Act is given in Appendix 13 (page 116).

1.5 Legal Requirements - Municipal Plans

1.5.1 Pursuant to section 3(4) of the Emergency Plans Act, 1983, the municipalities designated in Appendix 2 (page 49) shall formulate plans to deal with nuclear emergencies at the designated nuclear facility in their vicinity. Municipalities which are specified as host municipalities in evacuation plans contained in the Provincial Nuclear Emergency Plan, shall formulate plans to receive, shelter and care for such evacuees.

1.5.2 As required by section 8 of the Emergency Plans Act, 1983, the above-mentioned plans shall conform to the Province's Nuclear Emergency Plan, and be subject to the approval of the Solicitor General. These plans shall also contain, where applicable, plans for the provision of services and assistance by county departments, local police forces and local boards, under Section 13(3) of the Act.

1.5.3 Municipal nuclear emergency plans shall authorize municipal employees to implement these plans in circumstances similar to those referred to in 1.4.6 above.

1.6 Guiding Principles

The following principles shall form the basis of all nuclear emergency planning and management in the Province of Ontario:

1.6.1 The Province of Ontario, through its designated agencies, has primary responsibility for the health, safety and welfare of all inhabitants of the province, and the protection of property. This responsibility covers nuclear emergencies.

1.6.2 Even though nuclear power and research facilities are designed and operated according to stringent safety standards, and those in Canada have an excellent safety record, emergency planning must operate on the basis that mechanical failure and/or human error can lead to accidents.

1.6.3 All plans shall be so devised as to be able to deal effectively with a broad range of possible accidents.

1.6.4 The more severe a postulated accident, the less likely is its occurrence. An appropriate balance shall be struck between risk and cost when assessing the level of emergency planning and preparedness required.

1.6.5 Exposure to radiation shall be kept as low as reasonably achievable.

1.6.6 As much planning and preparation as is practical shall be done in advance to enable a rapid, effective and efficient response to a nuclear emergency.

1.6.7 Preparations shall include a cost-effective program of public education for people who might be affected, to inform them of plans and to help them cope with a nuclear emergency.

1.6.8 As far as is practical, alerting and notification systems, emergency procedures, and protective measures shall be devised and implemented to avoid significant radiation exposure.

1.6.9 The Province shall assume control of offsite emergency operations as soon as practicable when a nuclear emergency occurs.

1.6.10 A policy of truth and openness shall be followed in providing information to the public and media during a nuclear emergency.

1.7 Responsibilities

The responsibilities, under this Plan, of various ministries of the Province, designated municipalities, nuclear facility operators and other organizations are given in Appendix 8 (page 71).

1.8 Administration

1.8.1 Administration of Plan

The Province's Nuclear Emergency Plan shall be administered by the Solicitor General, and he or she shall be responsible for its implementation.

1.8.2 Amendment

The Solicitor General is hereby empowered to amend or replace, after appropriate consultation, Parts II through VIII of the Province's Nuclear Emergency Plan, as well as the appendices and annexes of Part I (except Appendix 8), and these parts, appendices and annexes, as amended or replaced, shall then be deemed to be the original parts, appendices and annexes of the plan formulated by the Lieutenant Governor in Council.

1.8.3 Distribution and Upkeep

Numbered copies of the various parts of the plan will be issued according to the distribution list appended to this plan (page 125). Unnumbered copies will be available for others who may want or need them. Numbered amendments shall be issued by the Ministry of the Solicitor General to holders of numbered copies, who shall be responsible for inserting them into their copies of the plan, and thus keeping them up-to-date.

CHAPTER 2

PLANNING BASIS AND CONCEPTS

2.1 Types of Accidents

2.1.1 An accident in a nuclear reactor cannot result in a nuclear explosion. A typical nuclear accident that could cause a nuclear emergency - the probability is one in 10,000 years - is a Loss-of-Coolant Accident (LOCA). Such an accident, in a reactor with a vacuum containment (which most nuclear generating stations in Ontario have), would probably progress in the following stages:

(a) The flashing of escaping pressurized water into steam would result in an over-pressure in the reactor building, causing a puff of radioactivity to be emitted to the atmosphere before the reactor building vents are shut down.

(b) The vacuum building vents would open, reducing reactor building pressure below atmospheric. So long as this remained so, there would be no leakage or emission of radioactivity from the reactor building.

(c) As outside air leaks into the reactor building (and air used to operate instruments is discharged), the reactor building repressurizes. Before the reactor building can reach atmospheric pressure, however, the operator will discharge the vacuum building atmosphere through filters to the environment. The effects would be minimized through the decay of short-lived radioactive materials and through filtering.

2.1.2 Nuclear reactor containment is a system of massive concrete-and-steel barriers with a limited number of designed openings that are closely controlled and monitored. Although simultaneous failure of the containment system and a loss-of-coolant accident are highly unlikely, nuclear emergency planning is carried out to cope with any eventuality and to further minimize public risk.

2.1.3 The most serious nuclear accident for which detailed planning and preparation shall be done in Ontario is one producing an effective dose of 25 rem (250 mSv) at a distance of 1 km from the nuclear reactor.

2.2 Radiation Hazards

2.2.1 Nuclear accidents could result in two types of emissions:

(a) an airborne emission, involving a release of radioactive material into the atmosphere, and

(b) a liquid emission, such as a release of radioactive liquid into a river, lake or water course.

2.2.2 Radiation can affect the human body externally or internally during a nuclear emergency. Pathways include:

(a) External exposure to airborne or waterborne radioactive material, or to deposits on the body, clothing, ground, buildings and other objects.

(b) Internal irradiation from inhalation of radioactive material or the ingestion of radioactive material through consumption of contaminated food and water.

2.2.3 In managing a nuclear emergency the radiation hazards to be considered are:

(a) Initially, the main short-term danger would be external irradiation from the radioactive plume. Lesser hazards would be the inhalation of radioactive material, especially radioiodine which could be absorbed by the thyroid gland, or radioactive material deposited on the body, ground and food.

(b) After the release has ended, the long-term hazard would be from consumption of contaminated foods, especially milk and water. Lesser hazards would exist from deposited or resuspended radioactive material.

2.2.4 The levels of radioactivity that are expected to occur offsite in a nuclear emergency are extremely unlikely to expose people to the risk of radiation sickness or other acute effects. The main risk that emergency plans seek to avoid is an increase in the long-term incidence of cancer among the population.

2.3 Protective Measures

2.3.1 The body can be protected from external irradiation by preventing or minimizing its exposure to the radiation source by distance, by limiting the time of exposure or by shielding.

2.3.2 Complete protection from internal irradiation can be obtained by preventing ingestion or inhalation of radioactive material. Once radioactive material enters the body, radiation exposure diminishes with its decay, and ends when it leaves the body.

2.3.3 A special method of protection is possible for the thyroid gland, which absorbs and stores iodine. If there is a risk of radioiodine entering the body, the thyroid's capacity to absorb it can be reduced or eliminated by taking stable iodine before, or even shortly after, the radioiodine enters the body. This is known as thyroid blocking.

2.3.4 Specific protective measures available for dealing with the radiation hazard in a nuclear emergency are:

(a) Entry Control

To prevent or discourage non-essential persons from entering the danger area.

(b) Use of Protective Equipment

Protective equipment will usually be available only for the few emergency workers who will have need of it. However, the use of such items of clothing as plastic raincoats could ensure that contamination is limited.

(c) Thyroid Blocking

Use of stable iodine compounds described in 2.3.3 above.

(d) Sheltering

Remaining indoors with doors and windows closed and external ventilation turned off.

(e) Evacuation

Leaving an area or location that is, or may become, subject to radiation exposure which is higher than normal background levels.

(f) Decontamination

Removal of deposited radioactive material.

(g) Food Chain Protection

Preventing radioactive material from entering the food chain at any stage.

(h) Food and Water Control

Preventing consumption of contaminated or radioactive food and water.

2.3.5 More details on these protective measures, their implications, efficacy and limitations, are given in Appendix 6 (page 57) to assist those who have to decide upon the use of these measures.

2.4 Planning Zones, Sectors

2.4.1 The area around a nuclear facility for which a nuclear emergency plan is made shall be divided into the following zones:

(a) Contiguous Zone

The zone immediately surrounding a nuclear facility. An increased level of emergency planning and preparedness may be advisable within this area compared with the rest of the Primary Zone because of its proximity to the potential hazard.

(b) Primary Zone

The zone around a nuclear facility within which it would be prudent to plan and prepare measures against plume exposure, including evacuation. (The Primary Zone includes the Contiguous Zone.)

(c) Secondary Zone

A larger zone within which it would be prudent to plan and prepare measures against exposure from ingestion of radioactivity. (The Secondary Zone includes both the Primary and Contiguous Zones.)

2.4.2 The approximate sizes of the zones for the designated nuclear facilities in Ontario (listed in Appendix 2, page 49) shall be:

Contiguous Zone - 3 km radius
Primary Zone - 10 km radius, and
Secondary Zone - 50 km radius.

The distances will be taken from the reactor building(s). Planning zones are illustrated in Figure 1 (page 16). The distances for the Contiguous and Primary Zones are used as guides in drawing their outer sector boundaries (see 2.4.4 below), which also form the boundaries of these two zones.

2.4.3 The Primary Zone around a designated nuclear facility shall be divided into a number of Response Sectors, as indicated in Figure 1 (page 16). All emergency management measures, both operational and protective, shall be planned and implemented in terms of these sectors.

2.4.4 Response Sectors will be demarcated so that, as far as possible, their boundaries lie along clearly recognizable features, such as roads and railway tracks. Other considerations will be municipal boundaries, population density and evacuation routes.

2.4.5 The Response Sectors for each designated nuclear facility are shown in that part of the plan which deals with it.

2.4.6 The Secondary Zone will be divided into four concentric sub-zones. Sub-zone A will be the Primary Zone. Sub-zone B will lie between the Primary Zone boundary and a 20 km radius circle. Sub-zones C and D will lie between the 20 km and 30 km circles, and the 30 km and 50 km circles, respectively. Sub-zones B, C and D will each be sub-divided into eight standard zonal sectors as illustrated in Figure 1 (page 16). The portion of each zonal sector lying within a sub-zone shall be a sub-sector, and shall be designated as shown in Figure 1.

2.5 Population Groups

2.5.1 A decision on the need for a protective measure in a Response Sector, or an area of the Secondary Zone, shall generally be based on the projected dose to the most exposed individual in the Critical Group. This is a group which, by virtue of age, sex or dietary habits, is expected to receive the highest projected dose.

2.5.2 When considering the application of protective measures to a Response Sector, or an area of the Secondary Zone, certain groups within the general population may need special consideration:

(a) Vulnerable Group

A group which, because it is more vulnerable to radiation, may require protective measures not considered necessary for the general population, such as pregnant women and, in some cases, children.

(b) Special Group

A group for which special constraints arise in the application of a protective measure, such as intensive care patients in hospitals and institutions, bedridden residents in nursing homes, handicapped persons and prison inmates.

2.6 Protective Action Levels

2.6.1 Protective Action Levels (PALs) serve as aids in planning and decision-making during an emergency. Expressed in terms of projected radiation doses, they provide guidance on the need to take specific protective measures, such as evacuation, sheltering, thyroid blocking and banning consumption of affected foods.

2.6.2 PALs for a protective measure are laid down as a lower and an upper level, which carry the following significance:

(a) Lower Level

Below this level, the protective measure would not normally be justified. At or above this level, the protective measure should be applied unless valid reasons exist for deferring action.

(b) Upper Level

At or above this level, the protective measure shall be implemented, unless implementation entails demonstrably greater risks for the people involved.

2.6.3 The specific Protective Action Levels to be used in Ontario are prescribed in Appendix 3 (page 50).

2.7 Planning Times

2.7.1 For planning purposes the following times shall be used:

(a) The duration of an initial puff could vary from two minutes (large LOCA) to 30 minutes (small LOCA, or large LOCA with impaired containment). See 2.1.1 (page 7).

(b) The interval between an initial puff and the start of a sustained emission could vary from half an hour (impaired containment) to about five days. The typical time for repressurization of a normally operating reactor containment system would be eight hours to several days.

(c) The duration of a sustained (or intermittent) emission could be several days. The largest release of radioactivity would occur during the first day.

2.8 Concept of Operations

Operations will be conducted in two successive phases (see Figure 2, page 17):

2.8.1 Phase 1

The emergency phase: Urgent action is required to deal with the immediate effects of an actual or potential emission. Such action will be based mainly on pre-arranged plans, procedures and preparations.

This phase begins with the first warning that a significant problem exists at the nuclear facility, and is ended after the nuclear facility is in a safe shutdown condition and systems to prevent further uncontrolled emissions are operational. During this phase the following types of emergency management operations would generally be required:

(a) Plume Exposure Control

All necessary measures designed to avoid or limit exposure to the plume (and surface deposits from it) would be undertaken.

(b) Ingestion Control

Initially, preventing consumption of food and water that may have been contaminated. As Plume Exposure Control operations wind down, more effort and attention will be focussed on Ingestion Control operations. In the event of a purely liquid emission, the latter type of operations would obviously be the main ones undertaken right from the start of the emergency.

(c) Restoration

Mainly, rescinding of protective measures in force, including, where safe, the return of evacuees to their homes.

2.8.2 Phase 2

The follow-up phase when action is required to assess and deal with the long term and the relatively less serious effects of the emission, while at the same time restoring conditions to normal. During this phase the following types of emergency management operations would take place:

(a) Ingestion Control

Mainly, assessment of the food chain and water sources for possible contamination, and taking measures to deal with it.

(b) Restoration

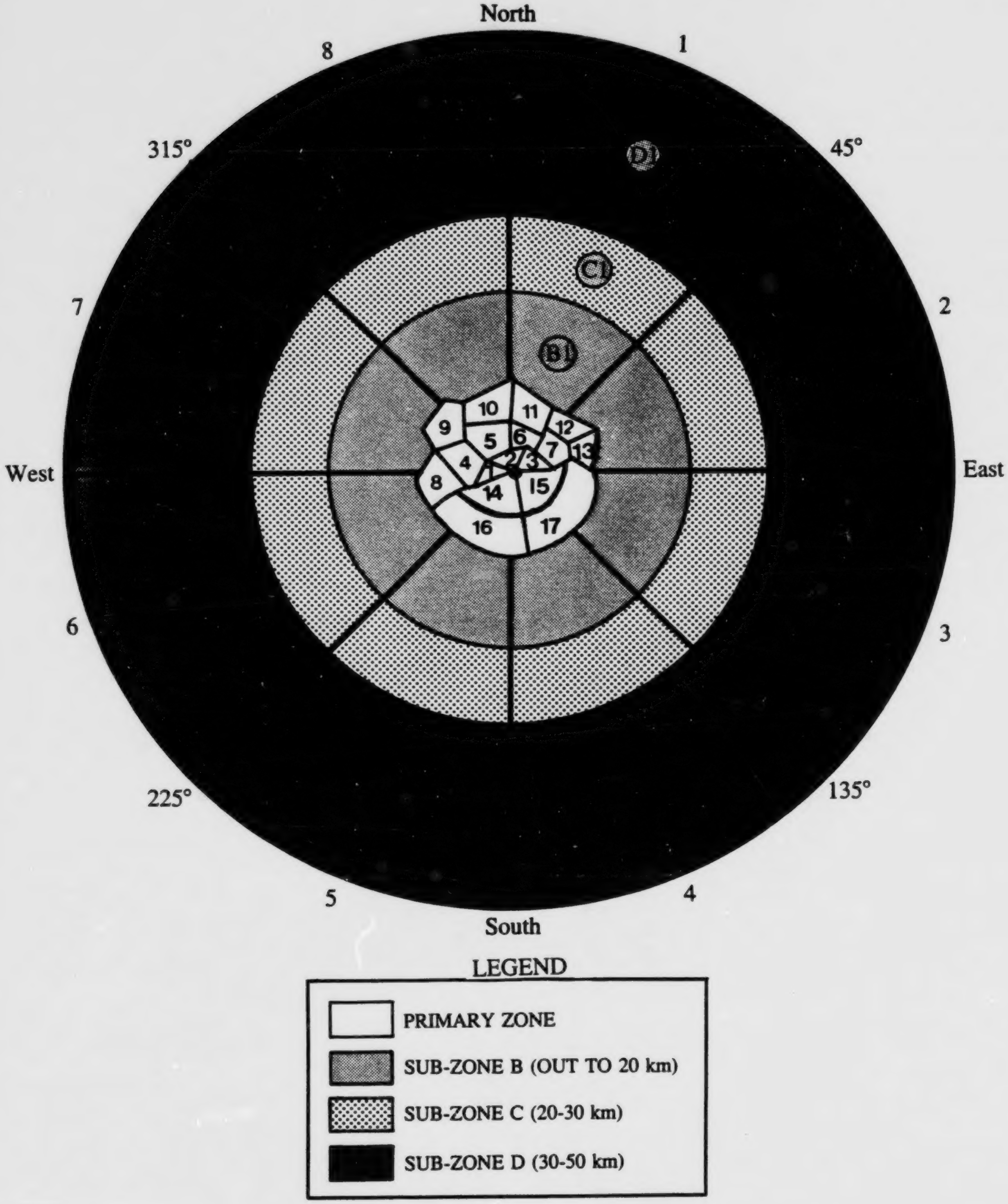
Measures to restore conditions to normal, including assessment and payment of compensation for losses incurred during the emergency.

2.9 Modifications to Concepts

2.9.1 The basic operational and organizational concepts described in this plan may need to be modified when applied to nuclear facilities with special circumstances, such as Chalk River Nuclear Laboratories, the Rolphton nuclear facility, and Enrico Fermi 2.

2.9.2 The operational concept may also need to be modified in case of a protracted, intermittent venting of reactor containment. This may require the Provincial and municipal Phase 1 organizations to be periodically reactivated during Phase 2 so that, if necessary, precautionary and protective measures may be undertaken. However, this action would not be necessary for the venting of small amounts of radioactivity; the Phase 2 organization could take appropriate measures.

FIGURE 1: PLANNING ZONES AND SECTORS
(Not to scale)

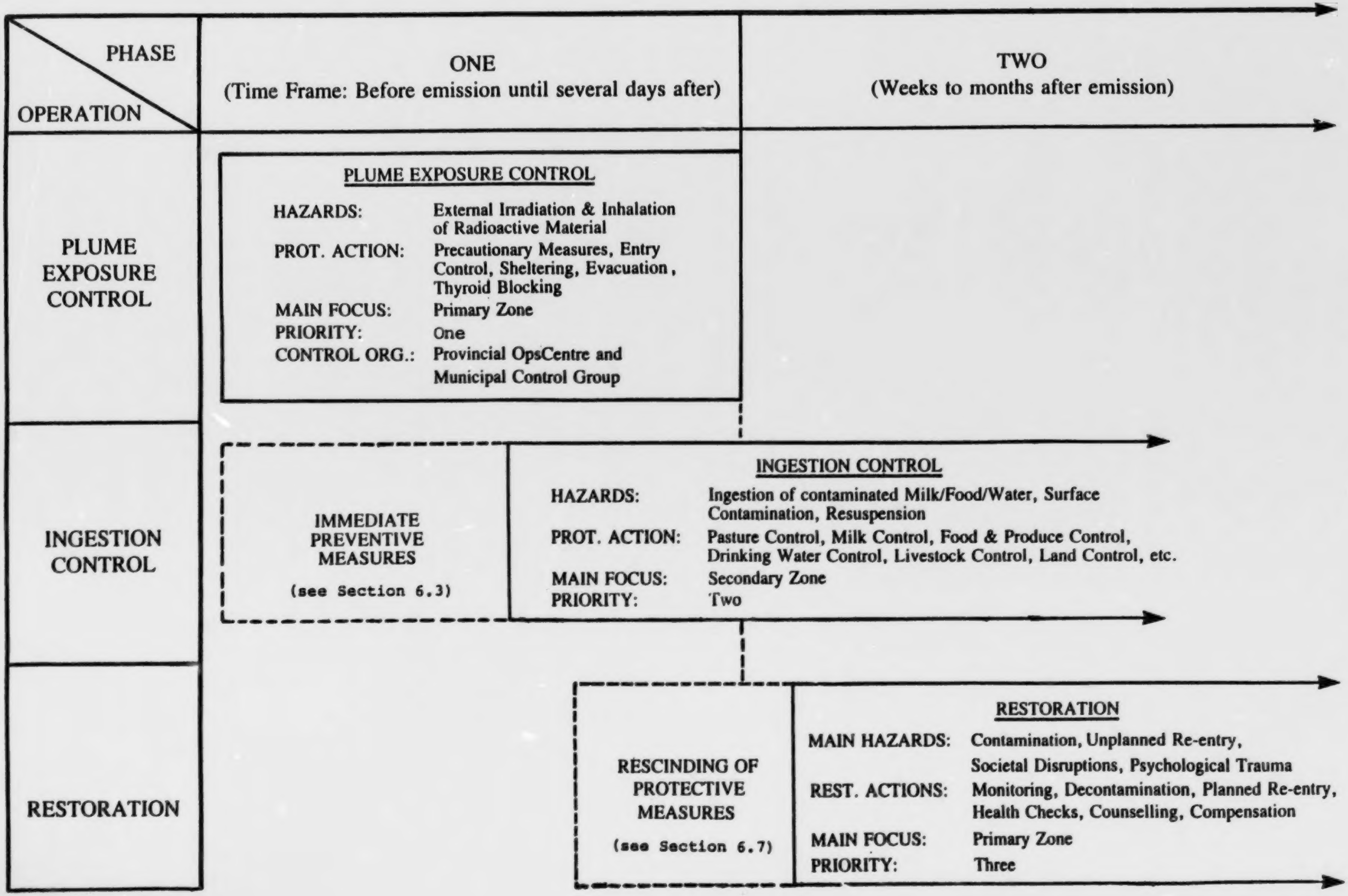

North
8
1
315°
45°
D1
C1
B1
7
2
10
11
9
12
5
6
7
13
4
2
3
8
1
14
15
16
17
West
East
6
3
225°
135°
5
4
South
LEGEND
PRIMARY ZONE
SUB-ZONE B (OUT TO 20 km)
SUB-ZONE C (20-30 km)
SUB-ZONE D (30-50 km)

NOTES: 1. Response Sectors 1, 2 and 3 constitute the Contiguous Zone.

2. Response Sectors 14, 15, 16 and 17 are lake sectors.

3. Sub-Sectors would be designated as shown by examples in Zonal Sector 1 .

FIGURE 2: CONCEPT OF OPERATIONS



PHASE / OPERATION

ONE
(Time Frame: Before emission until several days after)

TWO
(Weeks to months after emission)

PLUME EXPOSURE CONTROL

PLUME EXPOSURE CONTROL

HAZARDS: External Irradiation & Inhalation of Radioactive Material
PROT. ACTION: Precautionary Measures, Entry Control, Sheltering, Evacuation, Thyroid Blocking
MAIN FOCUS: Primary Zone
PRIORITY: One
CONTROL ORG.: Provincial OpsCentre and Municipal Control Group

INGESTION CONTROL

IMMEDIATE PREVENTIVE MEASURES
(see Section 6.3)

INGESTION CONTROL

HAZARDS: Ingestion of contaminated Milk/Food/Water, Surface Contamination, Resuspension
PROT. ACTION: Pasture Control, Milk Control, Food & Produce Control, Drinking Water Control, Livestock Control, Land Control, etc.
MAIN FOCUS: Secondary Zone
PRIORITY: Two

RESTORATION

RESCINDING OF PROTECTIVE MEASURES
(see Section 6.7)

RESTORATION

MAIN HAZARDS: Contamination, Unplanned Re-entry, Societal Disruptions, Psychological Trauma
REST. ACTIONS: Monitoring, Decontamination, Planned Re-entry, Health Checks, Counselling, Compensation
MAIN FOCUS: Primary Zone
PRIORITY: Three

CHAPTER 3

PLANNING AND PREPARATION

3.1 Responsibility

Responsibilities for nuclear emergency planning and preparation of the various organizations involved are assigned in the annexes to Appendix 8 (page 71).

3.2 Existing Organization

3.2.1 Emergency Planning Committee of Cabinet

This committee, established by the Lieutenant Governor in Council, under the chairmanship of the Solicitor General, monitors the state of emergency preparedness in Ontario and the state of emergency planning in the ministries and agencies of the Provincial government.

3.2.2 Coordinator of Emergency Planning

This person is appointed by the Lieutenant Governor in Council under the Emergency Plans Act, 1983. Under the direction of the Solicitor General, the Coordinator is responsible for monitoring, co-ordinating and assisting in the formulation of all provincial emergency plans, and in their implementation. The Coordinator ensures co-ordination with the emergency plans of municipalities, the Government of Canada and its agencies, and other jurisdictions whose emergencies or emergency plans might affect the province.

3.2.3 Other Emergency Planners

Nuclear facility operators and most of the Provincial ministries, agencies and the municipalities involved in nuclear emergency planning have staff members or organizations charged with the task of planning and preparation for such emergencies.

3.3 Plan Organization

3.3.1 To ensure that nuclear emergency planning is properly co-ordinated, that nuclear plans and procedures remain updated in conformity with the latest technical and operational developments, and that nuclear emergency preparedness is maintained at a high level at all times, a number of standing committees shall be established under this plan.

3.3.2 These committees shall be set up by the Solicitor General, and they shall be provided administrative and other support by this ministry.

3.3.3 The terms of reference and composition of each committee are set out in Appendix 9 (page 100).

3.4 Preparedness

3.4.1 Preparedness to deal with a nuclear emergency requires completion of many activities and arrangements before the emergency occurs. The main areas to which attention must be paid are listed below:

(a) Organization

An appropriate organizational structure should be designed to manage the various phases and aspects of the emergency. Such a structure is laid down in this plan.

(b) Planning

Plans should be developed, kept under review and updated.

(c) Procedures

Procedures must be established for performing the various essential activities identified in the plan.

(d) Alerting and Notification Systems

These must be established, and procedures laid down for their use. They should cover the notification of offsite authorities by the facility, the notification of members of emergency response organizations, and the alerting and notification of the affected population.

(e) Infrastructure

The essential facilities and equipment required to implement emergency plans must be acquired and maintained, while others must be identified and earmarked, and procedures established for their use in an emergency. These requirements would cover control centres, emergency information centres, telecommunication facilities and equipment, computer hardware and software, field monitoring vehicles and equipment, and so on.

(f) Planning Data-Base

A data-base of information must be built up for use in planning for and dealing with an emergency. The information would include data on background radiation levels, meteorological patterns, population, institutions and resources. The data must be organized for rapid access and frequently updated.

(g) Training

The emergency management organization and its personnel must be trained and practised in their functions. Various types of training can be used:

(i) individual training, including study courses

(ii) notification and assembly exercises for the emergency organization

(iii) emergency centre exercises, so various groups can practise operating procedures

(iv) field exercises, so field personnel can practise such activities as field monitoring, traffic and route control, and evacuation procedures, and

(v) full-scale exercises in which all aspects of the emergency plan are practised.

(h) Public Education

Populations likely to be affected in an emergency must be made aware of possible hazards and what they can do to minimize their effects. Apart from such general education programs, people living or working in the vicinity of nuclear facilities must be provided with specific instructions on measures to take in the event of an emergency.

(i) Study and Research

All areas affecting nuclear emergencies and their management must be the subject of appropriate study and research. By keeping abreast of research elsewhere, plans, procedures and infrastructure can always be kept at optimum levels.

CHAPTER 4

EMERGENCY ORGANIZATION

4.1 General

The basic concept of the emergency management organization used in this plan is illustrated in Figure 3 (page 28). This concept is elaborated further below.

4.2 Phase 1 Organization

4.2.1 Provincial Organization

As shown in Figure 3 (page 28), the body which controls all operations in Phase 1 is the Provincial Operations Centre, whose composition is covered in 4.2.2 below. Other Provincial organizations which operate in this phase are the Provincial Information Centre (4.2.4 below) and the Ingestion Monitoring Organization (4.2.3 below). The Province also provides some of the staff of the Local Information Centre (4.2.6 below). Certain Provincial Ministries set up special action groups (4.2.5 below).

4.2.2 Provincial Operations Centre

The organization of the Provincial Operations Centre (OpsCentre) is shown in Figure 4 (page 29). The general responsibilities and main functions of the various components are outlined below. Detailed functions are laid down in the standard operating procedures of the OpsCentre.

(a) Executive Authority

The Premier of Ontario, or a Minister (normally the Solicitor General) designated by the Premier, exercises the emergency powers available under the Emergency Plans Act, 1983. He or she provides over-all direction to the management of the emergency and makes all necessary decisions.

(b) Executive Director

Functions as chief of staff to the Executive Authority, and, during the latter's absence, acts as his representative, making the required decisions within the policy and mandate prescribed by the Executive Authority.

(c) Advisory Group

Meets regularly to review the developing situation and, based on input from other groups in the OpsCentre, makes necessary recommendations to the Executive Authority.

(d) Technical Group

Provides the technical input into the decision-making process. The Technical Support Section (TSS), based on meteorological and field monitoring data and source term (emissions of radioactivity) estimates, carries out the calculations required to project offsite effects. The Technical Assessment Section (TAS), besides producing source term estimates, carries out a more generalized technical assessment of the developing situation. It also assigns a safety status to Response Sectors (see Section 6.9, page 45).

(e) Operations Group

Provides operational input into the decision-making process, and implements the decisions taken by issuing directives to municipalities, ministries and other agencies and organizations. It maintains continuous contact and liaison with these bodies.

(f) Information Group

Provides input, for the decision-making process, regarding public and media perspectives and reactions. It implements decisions taken regarding emergency information by issuing policy guidance and directives to the Provincial Information Centre. It monitors the emergency information and media relations operation, and provides feedback to all elements of the OpsCentre.

(g) Ingestion Monitoring Control Group

When Ingestion Control monitoring is to begin, this group conducts it through the Ingestion Monitoring Organization. During Phase 1 it will receive its direction from the Executive Director, and technical advice and support from the Technical Group.

(h) Liaison Group

Representatives of the Federal Government and possibly of other jurisdictions. These persons ensure liaison and exchange of information between their organizations and the OpsCentre. They also act as the channel for Provincial requests for assistance, if required.

4.2.3 Ingestion Monitoring Organization

This organization, detailed in Figure 8 (page 33), will be activated with the rest of the emergency organization, though, except for the Ingestion Monitoring Control Group (IMCG), usually on a stand-by status. Its field elements may be moved to a forward location. When the situation is considered to have stabilized, it will start field monitoring under the directions of the IMCG.

4.2.4 Provincial Information Centre

Responsible for the detailed conduct of the emergency information operation. It provides the main interface with the media. The organization of this centre is shown in Figure 5 (page 30). The main functions of its components are outlined below, while their interaction with other agencies, the media and the public is illustrated in Figure 6 (page 31):

(a) Control Desk

Responsible for the management and functioning of the centre.

(b) Public Section

Advisories Desk

Transmit public service announcements and protective action directives to other InfoCentres (through the Official Section) and to designated news media (known as Special Media) serving the affected section of the public. (Advance arrangements shall be made with special media to disseminate news and directions during an emergency.)

Public Information Desk

The source of information and liaison for the Public Information Facility which responds to direct phone-in queries from the public.

(c) Media Section

Spokespersons

The spokespersons brief the media at the regular InfoCentre press briefings.

News Desk

Answer telephone queries from the media.

Media Service Desk

Provide news media at InfoCentre with background information, press kits, help in working on stories and transmitting them, and administrative assistance.

Writers' Pool

Write press releases, backgrounders, and bulletins based on material provided by the InfoGroup at the OpsCentre. (If the OpsCentre and InfoCentre are adjacent to each other, there should be only one Writers' Pool for both of them.)

(d) Official Section

InfoCentres Desk

Transmit public directives, press releases and other information to other InfoCentres (such as the Local and the Federal) and act as liaison to them.

Ministries Desk

Pass information on the situation to information officers of Provincial ministries and official agencies. Answer their queries, and those of legislators and other elected officials.

(e) Assessment Section

Media Monitoring Facility

Continuously monitor news media (especially radio and TV) to assess public and media perceptions and reactions.

Editorial Desk

Obtain assessments from other sections and sources and produce regular feedback reports.

Rumour Control Desk

Receive, record, check out and counter rumours.

(f) Administration Section

Handle reception and security, telecommunications, reproduction, preparation of the auditorium for briefings, housekeeping, supplies and stores.

4.2.5 Ministry Action Groups

The Ministries of Agriculture & Food, Community & Social Services, and Transportation & Communications shall set up Emergency Action Groups to direct and co-ordinate ministry actions according to the requirements of this plan or the directions of the Provincial Operations Centre.

4.2.6 Municipal Organization

The organization of the municipal structure for undertaking emergency operations in Phase 1 shall be laid down in municipal emergency plans. The body that controls these operations is referred to in this plan as the Municipal Control Group (MCG). Where there are a number of small municipalities with areas inside the Primary Zone of a nuclear facility, they shall set up a joint Municipal Control Group. This group shall also include representatives of appropriate county departments and local boards such as health, social services and police forces. The necessary co-ordination to achieve such a joint MCG, and provide it with the means to function effectively in an emergency, should be provided by the county, with the consent of the affected municipalities.

4.2.7 Local Information Centre

Set up in the area of the municipality and nuclear facility involved, preferably near the Municipal Control Group location. It provides local information and a point of contact for media operating in the area. It is jointly staffed by the Province, the nuclear facility operator and the municipality. Its detailed organization shall be laid down in the Provincial Information Plan.

4.2.8 Nuclear Facility Operator's Organization

The facility operator shall make provision for the organization required to carry out the responsibilities assigned to it in Phase 1.

4.3 Phase 1 Telecommunications

The effective functioning of the Phase 1 emergency organization is dependent on reliable telecommunications. The basic essential telecommunication links are shown in Figure 7 (page 32). Guaranteed links should be backed-up by alternative circuits, such as radio. Wherever possible, other links should also have such back-up.

4.4 Phase 2 Organization

4.4.1 Provincial Organization

The Provincial organization that operates in Phase 2 is shown in Figure 8 (page 33). The main functions of these bodies are given below. Their detailed functions shall be laid down in their manuals or standard operating procedures.

4.4.2 Phase 2 Advisory Committee

The composition of the Committee is given in Figure 8 (page 33). The PTAC shall advise the Executive Authority on Ingestion Control and Restoration measures, and shall co-ordinate their implementation. It shall also provide general direction to the field monitoring operations to be carried out in Phase 2.

4.4.3 Ingestion Monitoring Organization

Under the general direction of the PTAC, the IMO shall conduct the field monitoring and analysis of samples required to decide on Ingestion Control measures.

4.4.4 Technical Support Section

It shall direct the restoration field monitoring, and co-ordinate it with that being carried out by the Ingestion Monitoring Organization. Based on the results of both these monitoring operations, it shall provide dose projections and evaluations to the PTAC to assist in decision-making.

4.4.5 Municipal Organization

The normal municipal organization should be able to implement Ingestion Control and Restoration operations within the municipality. Where necessary, the Municipal Control Group may continue into Phase 2.

4.4.6 Nuclear Facility Operator's Organization

The facility operator shall provide the organization necessary to carry out the functions assigned to it in this plan for Phase 2.

4.4.7 Emergency Information Organization

The Phase 1 emergency information organization may be continued into Phase 2 for as long as considered necessary. Thereafter, the normal public information organizations of the government, municipalities and nuclear facility operator shall provide the required information to the media and the public on Phase 2 measures.

FIGURE 3: EMERGENCY MANAGEMENT ORGANIZATION

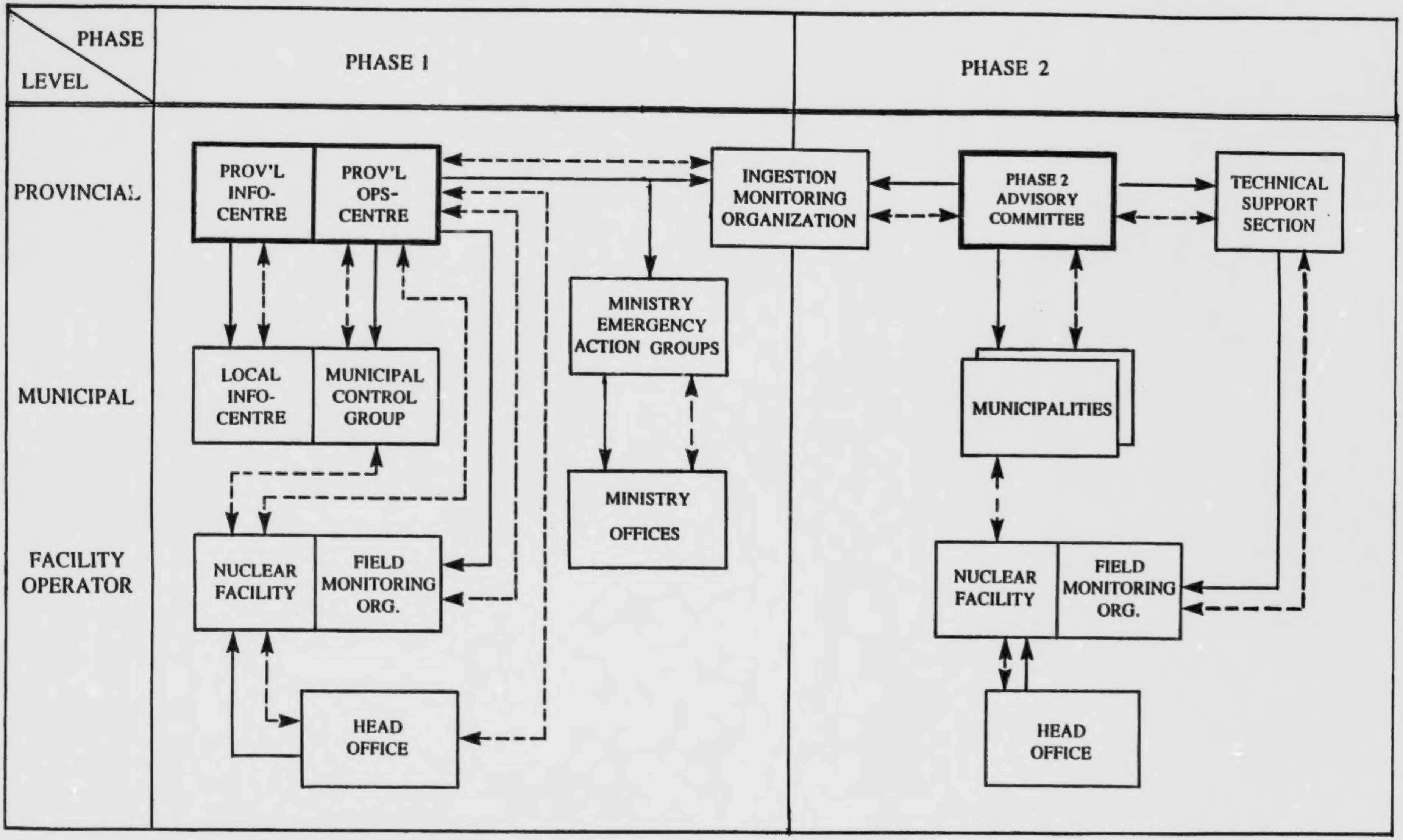

Direction
Information/Data/Advice
PHASE
LEVEL
PHASE 1
PHASE 2
PROVINCIAL
MUNICIPAL
FACILITY OPERATOR
PROV'L INFO-CENTRE
PROV'L OPS-CENTRE
LOCAL INFO-CENTRE
MUNICIPAL CONTROL GROUP
NUCLEAR FACILITY
FIELD MONITORING ORG.
HEAD OFFICE
MINISTRY EMERGENCY ACTION GROUPS
MINISTRY OFFICES
INGESTION MONITORING ORGANIZATION
PHASE 2 ADVISORY COMMITTEE
TECHNICAL SUPPORT SECTION
MUNICIPALITIES
NUCLEAR FACILITY
FIELD MONITORING ORG.
HEAD OFFICE

FIGURE 4: PROVINCIAL OPERATIONS CENTRE

EXECUTIVE AUTHORITY
PREMIER/MINISTER

EXECUTIVE DIRECTOR

TECHNICAL GROUP

TECH. ASSESSMENT SECTION
- Head, Technical Group
- Health Physicists
- Nuclear Systems Specialists
- AECB** Reactor Specialist

TECH. SUPPORT SECTION
- Head
- Meteorologist
- Met. Modeller
- Health Physicists
- Monitoring Recorder
- Data Coordinator
- Water Modeller (Stand-by)

INGESTION MONITORING CONTROL GROUP
- Head
- Min. of Ag. & Food Rep.
- Min. of Environment Rep.

ADVISORY GROUP
- Head, Technical Group
- Head, Operations Group
- Director of Information
- Assoc. Dir. of Information
- Others (as needed)

LIAISON GROUP
- Federal Gov't Rep.
- Local DND* Rep.
- Others (as appropriate)

SUPPORT STAFF
- Admin. Officer
- Typists
- Messengers
- Telephone Operators
- Radio Operators
- Map Markers

OPERATIONS GROUP
- Head, Operations Group
- Deputy Head
- Operations Staff Officers
- Min. of Ag. & Food Rep.
- Min. of Community & Soc. Svc. Rep.
- Min. of Environment Rep.
- Min. of Health Rep.
- Min. of Nat. Resources Rep.
- Min. of Transport,& Comm. Rep.
- Ontario Provincial Police Rep.
- Ontario Hydro/AECL Rep.
- Municipal Rep(s) (Primary Zone)

INFORMATION GROUP
- Director of Information
- Associate Director of Information
- Technical Liaison
- Operations Liaison
- InfoCentre Liaison
- Writer(s)

* Department of National Defence

** Atomic Energy Control Board

FIGURE 5: PROVINCIAL INFORMATION CENTRE

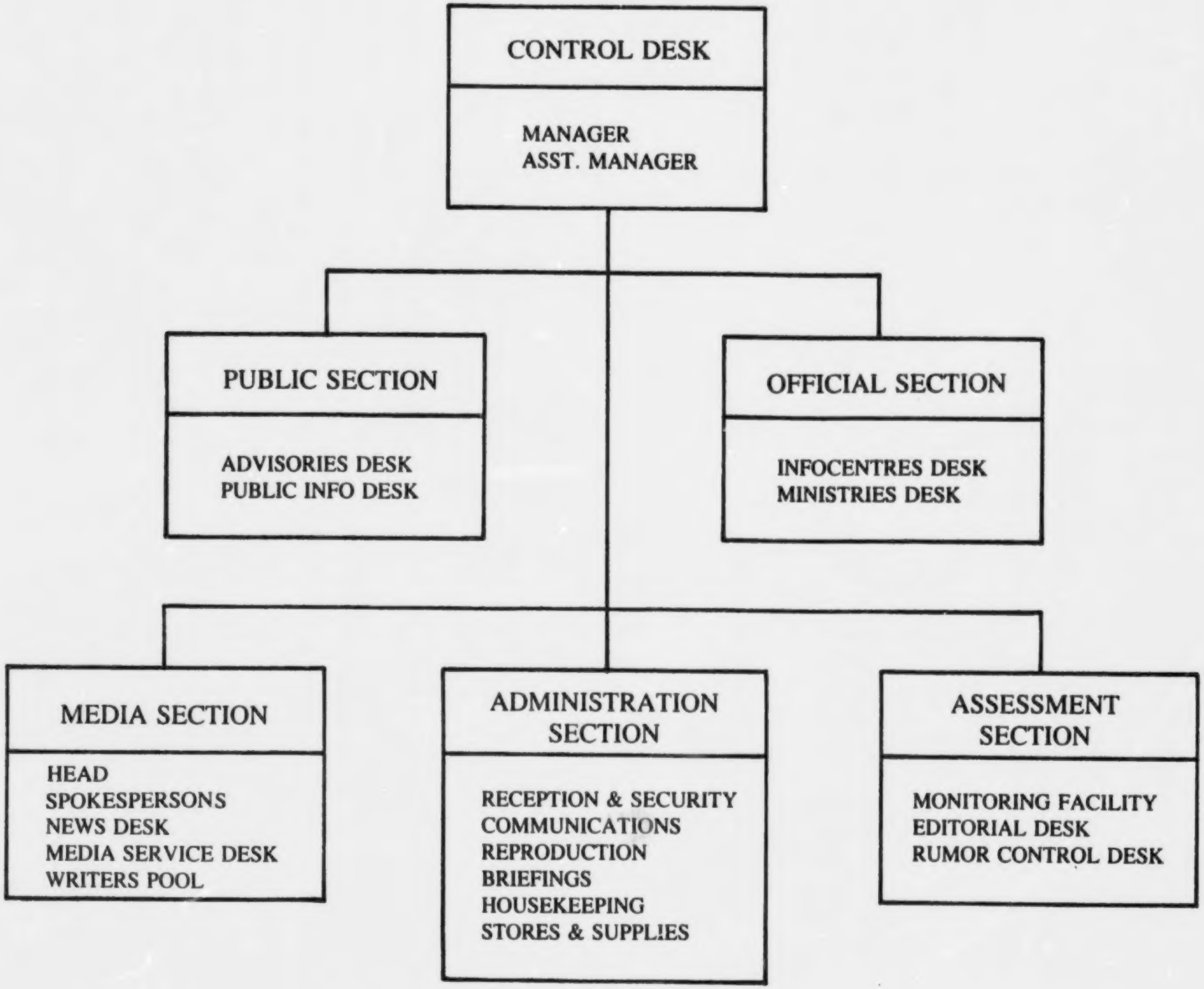
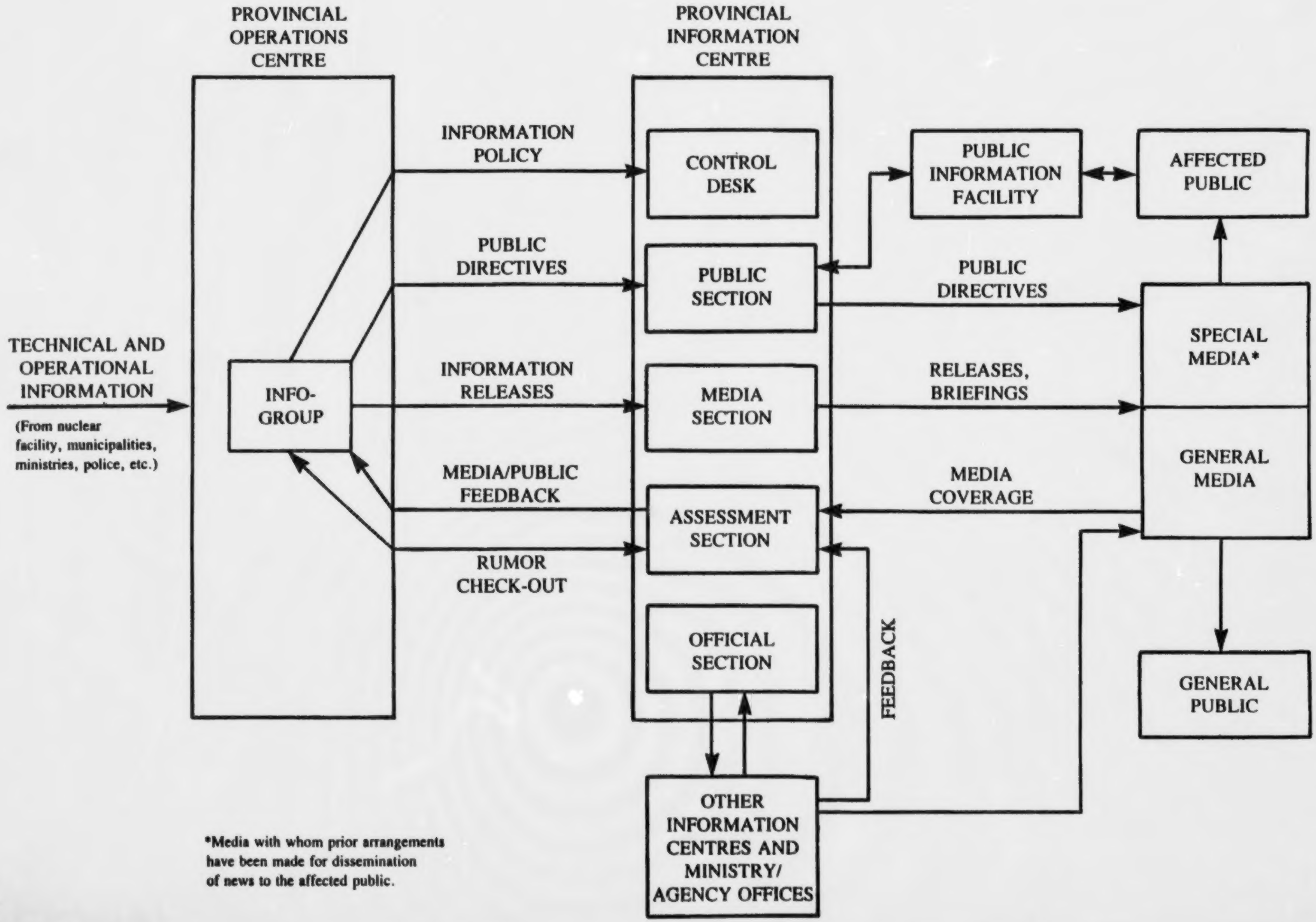

CONTROL DESK
MANAGER
ASST. MANAGER
PUBLIC SECTION
ADVISORIES DESK
PUBLIC INFO DESK
OFFICIAL SECTION
INFOCENTRES DESK
MINISTRIES DESK
MEDIA SECTION
HEAD
SPOKESPERSONS
NEWS DESK
MEDIA SERVICE DESK
WRITERS POOL
ADMINISTRATION SECTION
RECEPTION & SECURITY
COMMUNICATIONS
REPRODUCTION
BRIEFINGS
HOUSEKEEPING
STORES & SUPPLIES
ASSESSMENT SECTION
MONITORING FACILITY
EDITORIAL DESK
RUMOR CONTROL DESK

FIGURE 6: EMERGENCY INFORMATION FLOW



PROVINCIAL OPERATIONS CENTRE
PROVINCIAL INFORMATION CENTRE
TECHNICAL AND OPERATIONAL INFORMATION
(From nuclear facility, municipalities, ministries, police, etc.)
INFO-GROUP
INFORMATION POLICY
PUBLIC DIRECTIVES
INFORMATION RELEASES
MEDIA/PUBLIC FEEDBACK
RUMOR CHECK-OUT
CONTROL DESK
PUBLIC SECTION
MEDIA SECTION
ASSESSMENT SECTION
OFFICIAL SECTION
OTHER INFORMATION CENTRES AND MINISTRY/ AGENCY OFFICES
FEEDBACK
PUBLIC INFORMATION FACILITY
AFFECTED PUBLIC
PUBLIC DIRECTIVES
RELEASES, BRIEFINGS
MEDIA COVERAGE
SPECIAL MEDIA*
GENERAL MEDIA
GENERAL PUBLIC

*Media with whom prior arrangements have been made for dissemination of news to the affected public.

FIGURE 7: PHASE 1 TELECOMMUNICATIONS (BASIC)

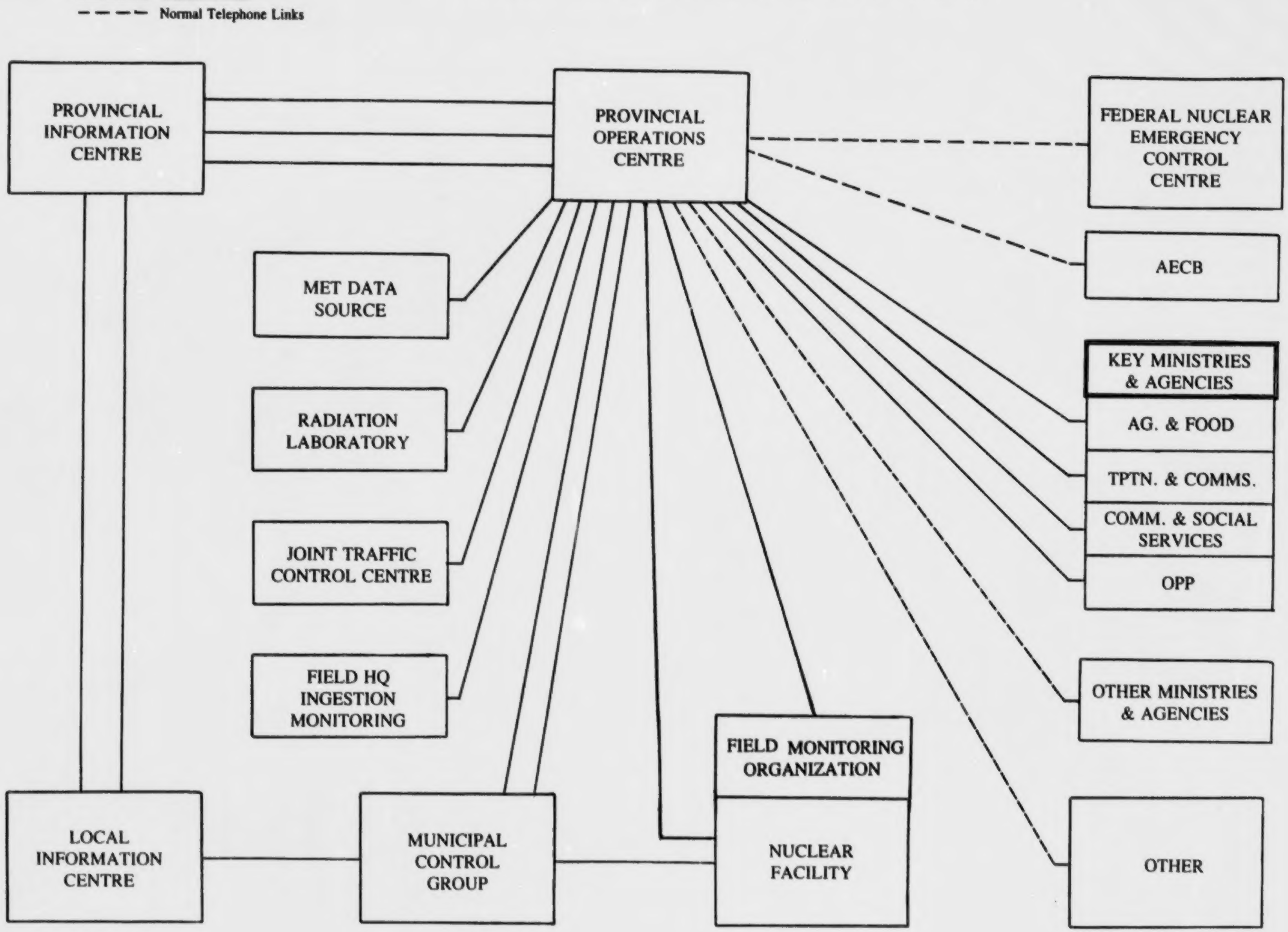
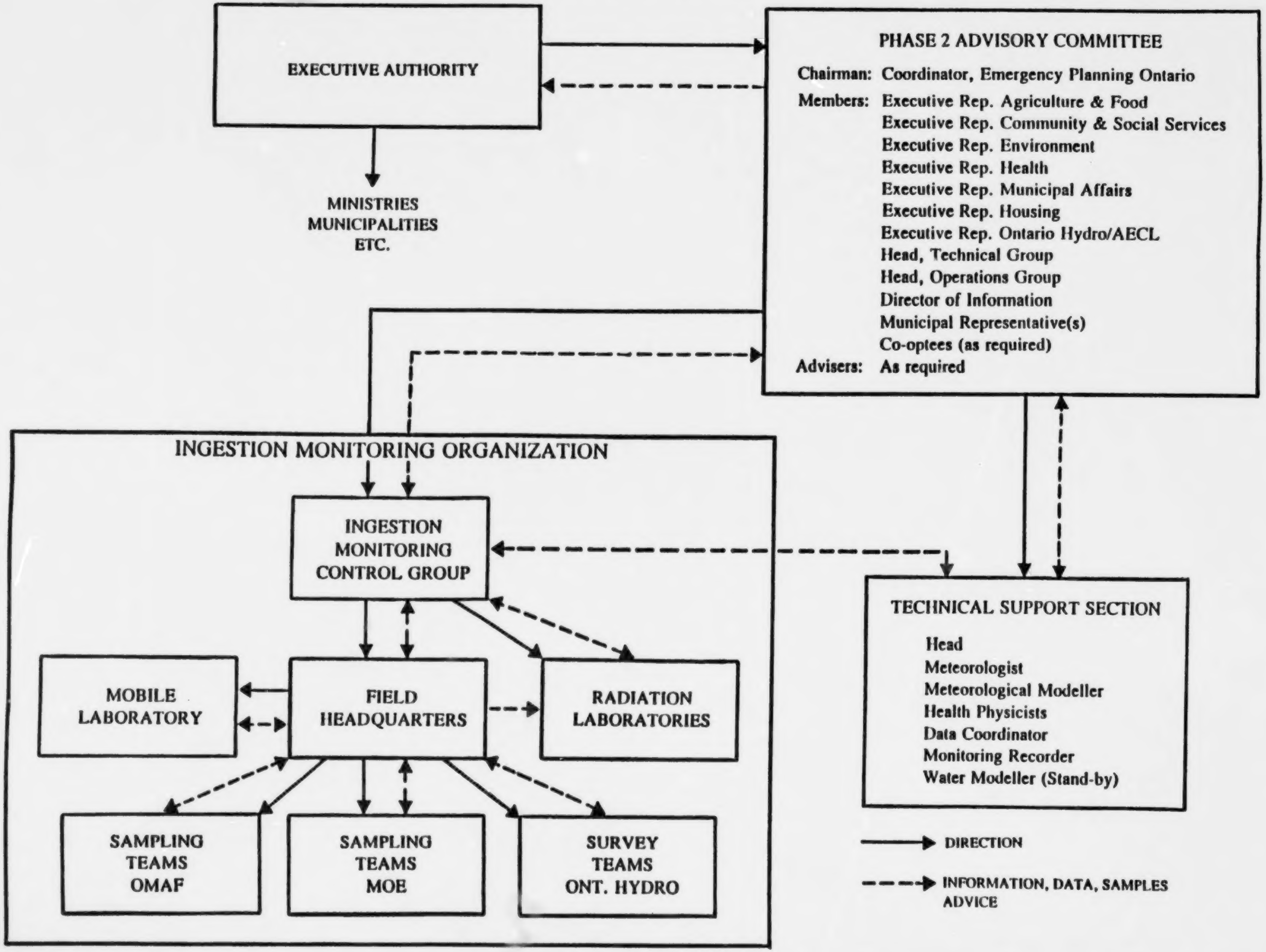

Guaranteed Links
Normal Telephone Links
PROVINCIAL INFORMATION CENTRE
PROVINCIAL OPERATIONS CENTRE
FEDERAL NUCLEAR EMERGENCY CONTROL CENTRE
AECB
MET DATA SOURCE
RADIATION LABORATORY
JOINT TRAFFIC CONTROL CENTRE
FIELD HQ INGESTION MONITORING
KEY MINISTRIES & AGENCIES
AG. & FOOD
TPTN. & COMMS.
COMM. & SOCIAL SERVICES
OPP
OTHER MINISTRIES & AGENCIES
FIELD MONITORING ORGANIZATION
NUCLEAR FACILITY
OTHER
LOCAL INFORMATION CENTRE
MUNICIPAL CONTROL GROUP

FIGURE 8 - PHASE 2 PROVINCIAL ORGANIZATION


EXECUTIVE AUTHORITY
MINISTRIES
MUNICIPALITIES
ETC.
PHASE 2 ADVISORY COMMITTEE
Chairman: Coordinator, Emergency Planning Ontario
Members: Executive Rep. Agriculture & Food
Executive Rep. Community & Social Services
Executive Rep. Environment
Executive Rep. Health
Executive Rep. Municipal Affairs
Executive Rep. Housing
Executive Rep. Ontario Hydro/AECL
Head, Technical Group
Head, Operations Group
Director of Information
Municipal Representative(s)
Co-optees (as required)
Advisers: As required
INGESTION MONITORING ORGANIZATION
INGESTION MONITORING CONTROL GROUP
MOBILE LABORATORY
FIELD HEADQUARTERS
RADIATION LABORATORIES
SAMPLING TEAMS OMAF
SAMPLING TEAMS MOE
SURVEY TEAMS ONT. HYDRO
TECHNICAL SUPPORT SECTION
Head
Meteorologist
Meteorological Modeller
Health Physicists
Data Coordinator
Monitoring Recorder
Water Modeller (Stand-by)
DIRECTION
INFORMATION, DATA, SAMPLES ADVICE

CHAPTER 5

OPERATIONAL RESPONSIBILITIES

5.1 General

5.1.1 Responsibilities for emergency operations are dealt with generally in the annexes to Appendix 8 (page 71).

5.1.2 An overview of the conduct of operations in a nuclear emergency was given in Section 2.8, where the two phases of dealing with the emergency, and the operations conducted in each phase, were outlined. The basic concept of operations was summarized in Figure 2 (page 17). The operational organization was described in Chapter 4. This chapter deals with the declaration of an emergency, notification requirements, Phase 1 and Phase 2 operational responsibilities, and the responsibilities for providing information to the public and the media.

5.2 Declaration of Emergency

5.2.1 Under Section 6 of the Emergency Plans Act, 1983 (see Appendix 10, page 106) the Premier of Ontario can declare that an emergency exists in the province or in any part thereof. The procedure for such a declaration in the context of this plan is given in Appendix 5 (page 55).

5.2.2 Under Section 4 of the Emergency Plans Act, 1983, the head of council of a municipality can declare that an emergency exists in the municipality, or in any part thereof. The procedure for such a declaration shall be laid down in municipal emergency plans.

5.2.3 The Premier of Ontario may, at any time, declare that an emergency has terminated (Section 4(4)). The head of council or the council of a municipality may, at any time, declare that a municipal emergency has terminated (Section 4(2)).

5.3 Notification Systems

5.3.1 The following notification systems and procedures shall be set up under this plan:

(a) Initial Notification

Between the nuclear facility and the Provincial and municipal authorities responsible for offsite action (see 5.3.2 below).

(b) Internal Notification

Each organization or agency required to respond to a nuclear emergency shall have an internal notification procedure to warn all concerned of the occurrence of a nuclear emergency.

(c) External Notification

Organizations or agencies which might be affected by a nuclear emergency, or may be required to assist in responding to it, shall be notified at an appropriate stage. The responsibility for making such notification shall be prescribed in emergency plans.

(d) Public Notification

Municipalities which have areas lying within the Primary Zone of a nuclear facility shall make appropriate arrangements to notify the population within the zone of the occurrence of a nuclear emergency.

5.3.2 Initial Notification

A nuclear facility shall make an initial notification to the prescribed Provincial and municipal authorities whenever its emergency response capability is significantly affected, or upon the occurrence (or the probability of the occurrence) of a substantial degradation or malfunction of a process system with potential offsite effects. However, a Category 1 notification shall only be made to the Province and not to the municipalities. For the detailed initial notification criteria, see Figure 9 (page 37).

5.3.3 Categories of Notification

(a) Nuclear facilities in Ontario, whenever making an initial notification, shall include in the message an estimate of the category of the notification. This estimate shall be based on the criteria contained in the table in Figure 9 (page 37). If, after the initial notification but before the Province assumes operational control, the category is assessed to be different to the one reported, the nuclear facility shall make a fresh notification to all concerned.

(b) Provincial and municipal offsite authorities shall react to the notification of a category in the manner prescribed in Figure 9 (page 37).

(c) The Province may review and, if considered appropriate after due consultation with the nuclear facility, revise the category assigned to the notification, and its category designation shall supersede the category currently in force.

5.4 Phase 1 Operational Responsibilities

The Phase 1 operational responsibilities are tabulated in Figure 10 (page 38).

5.5 Phase 2 Operational Responsibilities

The Phase 2 operational responsibilities are tabulated in Figure 11 (page 40).

5.6 Emergency Information Responsibilities

The responsibilities for provision of information to the public and the media in Phases 1 and 2 are tabulated in Figure 12 (page 41).

5.7 Procedures

Detailed functions shall be laid down in operating procedures and technical manuals for those bodies having operational responsibilities, as appropriate.

NOTIFICATION CATEGORY	NOTIFICATION CATEGORY DETERMINED BY EITHER*			INITIAL OFFSITE RESPONSE (PROVINCIAL/MUNICIPAL)
	STATION/SYSTEMS STATUS	OR	TOTAL PROJECTED DOSE AT STATION BOUNDARY FROM ALREADY OCCURRED, ONGOING AND/OR POTENTIAL EMISSION	
Category 1	Any event which could significantly affect station capability to deal with a nuclear emergency. OR Substantial degradation/malfunction (actual or probable) of a process system with potential offsite effects.		10 mrem effective (or 30 mrem thyroid) or more, from external exposure and inhalation, within the next 6 hours.	Monitor situation
Category 2	Substantial malfunction of a process system coupled with a malfunction of a safety system OTHER than the containment system (which is fully operational, and likely to remain so for the next 6 hours).		30 mrem effective (or 90 mrem thyroid) or more, from external exposure and inhalation, within the next 6 hours. —	Place emergency organization on standby. If and when appropriate, activate emergency plan and organization.
Category 3	Substantial malfunction of a process system coupled with a breach, malfunction or bypassing of the containment system, or the likelihood of this occurring within the next 6 hours.		100 mrem effective (or 300 mrem thyroid) or more, from external exposure and inhalation, within the next 6 hours.	Immediately activate emergency plan and organization.

*If more than one criterion is applicable, the Category used for notification will be the highest one indicated.

NOTES: 1. Notification will also be done when an external initiating event (eg, hostile action, extreme natural phenomena) could affect station/systems status or lead to an offsite emission. The category assigned will be according to the potential of the event.

2. In case of a purely liquid emission, the notification message shall include the key words: LIQUID EMISSION.

FIGURE 9 - INITIAL NOTIFICATION SYSTEM

NUCLEAR FACILITY

1. Notify provincial and municipal authorities according to established procedures and arrangements.
2. Conduct all necessary measures onsite to restore the situation to normal. However, any measures which could significantly, adversely affect dose offsite shall require consultation with, and seeking agreement of, the Provincial Operations Centre, except where time does not permit this because prompt actions, such as those to ensure personnel safety, are necessary.
3. Make appropriate protective action recommendations to the municipalities in the Primary Zone until the Province takes over operational control.
4. Subject to the priority of onsite requirements, assist municipalities in implementing protective measures.

MUNICIPALITIES

1. When notified, and appropriate, activate the municipal emergency plan and organization, and warn the public, as appropriate.
2. When the municipal plan is activated, declare a municipal emergency. Inform the Province.
3. Based on nuclear facility recommendations, decide on protective measures and implement them.* Once the Province takes over, act on protective action directives from the Provincial Operations Centre.
4. Provide regular updates on the situation in the municipal area to the Provincial Operations Centre.

PROVINCE

1. When notified, and appropriate, CEPO to activate the Nuclear Emergency Plan. Notify other jurisdictions.
2. As soon as practical, will take over operational control through the Provincial Operations Centre (OpsCentre).
3. When appropriate, will declare a Provincial emergency.
4. OpsCentre to direct field monitoring through the nuclear facility.
5. Based on continuous assessment of relevant factors, OpsCentre to decide on appropriate operational and protective measures, and issue directives for their implementation.
6. Ministries and agencies shall implement directives from the OpsCentre.

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* Municipal plans may permit certain municipal officials/employees to act immediately on such recommendations, if quick reaction is needed.

FIGURE 10 - OPERATIONAL RESPONSIBILITIES: PHASE 1

continued...

NUCLEAR FACILITY	MUNICIPALITIES	PROVINCE
5. Conduct field monitoring in the Primary Zone. When the Province assumes operational control, this will be carried out under the direction of the Provincial Operations Centre.		7. If and when appropriate, the Ingestion Monitoring Organization will deploy and begin field monitoring under direction of the OpsCentre.
6. Provide information and data to the Provincial Operations Centre on the status of facility systems and the results of field monitoring.		8. OpsCentre will rescind protective measures when no longer necessary.
		9. When appropriate, OpsCentre will declare end of Phase 1 and notify all concerned.

FIGURE 10 - OPERATIONAL RESPONSIBILITIES: PHASE 1 (continued)

PROVINCE

1. Will direct Ingestion Control and Restoration operations based on recommendations of the Phase 2 Advisory Committee (PTAC).
2. Provincial ministries and agencies shall implement directives of the Executive Authority.
3. Ingestion Monitoring Organization shall carry out field monitoring under direction of the PTAC.
4. The PTAC shall conduct the field monitoring required for restoration through the nuclear facility operator and other agencies.
5. Protective measures will be rescinded as and when appropriate.
6. When appropriate, the Provincial emergency will be terminated.

MUNICIPALITIES

1. Implement directives from the Province.
2. Take measures to restore conditions to normal within the municipal area.
3. Assist in the assessment of losses and damage suffered as a result of the emergency, under direction of the Province.

NUCLEAR FACILITY

1. Continue measures to restore the situation onsite to normal. However, any measures which could significantly, adversely affect dose offsite shall require consultation with, and seeking agreement of, the Province except where time does not permit this because prompt actions, such as those to ensure personnel safety, are necessary.
2. Subject to needs for the above, assist municipalities in dealing with the situation.
3. Carry out offsite field monitoring under direction of the Province.

FIGURE 11 - OPERATIONAL RESPONSIBILITIES: PHASE 2

PHASE 1	**PHASE 2**
1. In the initial stages of an emergency, information to the public and the media shall be provided by the nuclear facility operator and the affected municipalities.	1. If necessary, the Provincial Information Centre will continue to function into Phase 2, being closed down when no longer required.
2. A Local Information Centre shall begin to function as soon as it can be set up. The municipality and the nuclear facility operator shall then channel emergency information through it.	2. Thereafter, information will be provided through the normal information channels of the Province, municipalities and the nuclear facility operator.
3. As soon as the Province takes over operational control, the Provincial Information Centre shall assume responsibility for dissemination of all information on the emergency. The Local Information Centre shall be responsible for relaying information from the Provincial InfoCentre, and providing local news. The nuclear facility operator shall issue information through the Provincial Information Centre.	3. Official information on Ingestion Control and Restoration operations shall be approved by the Phase 2 Advisory Committee.
4. All official information on the emergency shall be approved by the Information Group of the Provincial Operations Centre.	

FIGURE 12 - EMERGENCY INFORMATION RESPONSIBILITIES

CHAPTER 6

OPERATIONAL POLICY

6.1 Activation of Emergency Plans

As a general guide, Provincial and municipal authorities, notified of a nuclear emergency by a nuclear facility, should react initially according to the category assigned, as indicated in Figure 9 (page 37).

6.2 Protective Action Decision-Making

6.2.1 Decisions on recommending or ordering protective action shall be taken so as to prevent, as far as possible, exposure to significant radiation. Where this is not possible, such exposure should be kept as low as reasonably achievable.

6.2.2 To ensure this, the various types of protective action shall be considered separately and adopted as and when appropriate:

(a) Precautionary Measures include closing recreation areas, controlling entry, suspending school classes, closing industrial/commercial establishments, suspending non-critical patient admissions into hospitals, and evacuation. Where appropriate, such measures shall be taken before exposure to radiation can occur.

(b) Immediate Preventive Measures include banning consumption and export of locally produced milk and vegetables, removing animals from pasture, and closing intakes of water supply systems. Such measures shall be considered, usually only in the Primary Zone, in the early stages of an emergency. For details, see Section 6.3 below.

(c) Protective Measures involve thyroid blocking, sheltering, evacuation and banning consumption of water and food items. Decisions on their application shall be taken as outlined below.

6.2.3 In deciding on protective measures, the operative technical criterion shall be projected dose. A continual updating of the projected dose for each sector, and a comparison of it with the Protective Action Levels (PALs), would indicate what protective measure is appropriate where, and when, as indicated below.

6.2.4 When the projected dose for a sector is expected to equal or exceed the lower PAL for a protective measure within that measure's lead time, that protective measure should be ordered for that sector, unless there are valid reasons for postponing such a decision.

6.2.5 When the projected dose for a sector is expected to equal or exceed the upper PAL for a protective measure within that measure's lead time, that protective measure shall be ordered for that sector, unless the implementation of the measure can be clearly shown to entail, under prevailing conditions, greater risk than the radiation exposure involved.

6.3 Immediate Preventive Measures

6.3.1 The following Ingestion Control measures shall be considered for application in the Primary Zone in the early stages of a nuclear emergency:

(a) Milk Control. All milk produced or processed in the zone shall be banned from consumption or export outside the zone.

(b) Water Control. Water supply system intakes in the zone shall be closed. The consumption of water from exposed sources in the zone shall be banned.

(c) Pasture Control. Milk- and meat-producing animals shall be removed from open pasture, confined indoors and put on stored feed and covered water supply.

(d) Produce & Crop Control. The consumption and export of produce and crops grown in the zone shall be banned.

(e) Livestock Control. The slaughter of livestock in the zone, and the export of animals and meat from the zone, shall be banned.

(f) Food Control. The consumption of exposed food shall be banned.

(g) Provided no radiation risk is incurred by drivers, all dairy farms' milk storages in the zone shall be cleared as early as possible. The milk collected shall be tested and then released if found suitable for consumption.

6.3.2 As the situation develops, and taking into account the results of field monitoring, these measures can be relaxed, modified or extended in scope.

6.4 Implementation of Protective Action

The guidelines laid down in Appendix 7 (page 63) shall be observed in planning and implementing protective and preventive measures during Phase 1 of a nuclear emergency.

6.5 Traffic Control

6.5.1 A traffic control plan shall be made and implemented for each Primary Zone and the main roads entering it or designated as evacuation routes. Where more than one police force has jurisdiction over this area and/or these roads, a joint traffic control plan shall be made, and shall be jointly implemented.

6.5.2 The traffic control plan shall be designed to allow implementation in three incremental stages:

(a) Stage 1. Automatically initiated as soon as the nuclear emergency plan is activated. The aim in this stage shall be to keep traffic flowing smoothly on the main evacuation routes and to ensure these routes are kept open. Also, to impose any pre-selected entry control measures laid down in the plan.

(b) Stage 2. Initiated when it appears likely that the emergency may require evacuations, or when spontaneous evacuation begins to occur. Traffic shall be prevented from entering the Primary Zone on the main evacuation routes and diverted. Stage 1 measures will continue.

(c) Stage 3. Initiated when it appears that particular sectors are likely to be evacuated. Additional resources shall be deployed to ensure that their evacuation proceeds smoothly up to the designated Reception and Evacuee Centres. Stages 1 and 2 measures will continue.

6.6 Emergency Information

The aim of the emergency information operation shall be to achieve the following principal objectives:

(a) Communicate to the affected public, through the appropriate media, guidance on actions required to ensure their safety and well-being.

(b) Provide to the general public and to the news media full and accurate information on the status of the emergency and measures being taken to deal with it.

(c) Monitor and assess the success of the emergency information function and provide feedback for decision-making.

6.7 Transition from Phase 1 to Phase 2

6.7.1 Once the technical requirements for ending Phase 1 (see paragraph 2.8.1, page 13) have been met, the Provincial Operations Centre shall concern itself with rescinding the protective measures imposed, especially the arrangements for the return of evacuees. Field monitoring shall be commenced, if not already started, for ingestion control purposes, and also for restoration measures. Based on its results, and the criteria prescribed in 6.8 below, evacuees shall be permitted to return to areas considered safe. If large numbers are involved, such return shall be carried out on an organized basis.

6.7.2 When all evacuees have returned to their homes, except any who may have to stay away because of contamination of their neighbourhood, the Provincial Operations Centre shall select an appropriate time for the end of Phase 1, and shall inform all concerned.

6.7.3 Before the end of Phase 1, the Phase 2 Advisory Committee shall convene and receive briefings on the situation. When Phase 1 ends, this committee shall take over responsibility for advising on, and co-ordinating, ingestion control and restoration operations.

6.8 Return of Evacuees

Evacuees should be permitted to return to an area evacuated during the emergency if the additional projected dose (integrated over one year) due to the return is under 0.5 rem (5 mSv). However, as long as the total projected dose (integrated over the next 50 years) from the accident in an evacuated area exceeds 10 rem (100 mSv), no return should normally be allowed. In between these values, the decision should be based on an assessment of the detriment versus the benefits of return.

6.9 Emergency Worker Safety

6.9.1 A system for ensuring the safety of emergency workers shall be implemented as follows:

(a) One or more Exposure Control Centres shall be set up to provide personal monitoring devices and, where necessary, protective equipment to emergency workers; to monitor, and if necessary decontaminate, workers leaving the affected area; and to maintain their radiation records.

(b) Periodically, the sectors in which workers may be required to operate shall be assigned a safety status in terms of a colour code.

(c) Emergency workers shall observe the precautions appropriate to the safety status of the sector they are working in.

6.9.2 Guidelines for assigning safety status and the precautions associated with each status are prescribed in Appendix 4 (page 51).

6.9.3 Safety status shall be assigned as follows:

(a) Initially, as laid down in the site-specific parts of the Provincial Nuclear Emergency Plan. These allocations may be varied by the Municipal Control Group on the advice of the nuclear facility.

(b) Once the Province assumes operational control, by the Provincial Operations Centre during Phase 1.

(c) During Phase 2, by the Coordinator, Emergency Planning Ontario, on the advice of the Head, Technical Group.

6.10 Operational Conventions

6.10.1 Time shall be local time, unless otherwise specified, expressed as for a 24-hour clock, starting with zero-hour at midnight. For example, 10 am shall be expressed as 1000, and 10 pm as 2200.

6.10.2 Location shall be expressed as a grid reference relative to the southwest corner of the 1000-meter squares formed on maps by the Universal Transverse Mercator grid lines drawn on them. The normal grid reference shall be in six figures, indicating position to the nearest 100 meters. Other systems of indicating position may be used by prior arrangement between the parties concerned.

6.10.3 Wind Direction shall always be expressed as, "From X degrees to Y degrees".

6.10.4 Radiological Units. The units of the old system (rem, curie, etc.) shall be used, though, wherever possible, their equivalents in the International (SI) system shall also be given in documents. A conversion table is given in Appendix 15 (page 124).

6.11 Terminology

It is necessary that common terminology be employed by everyone involved in the preparation and implementation of nuclear emergency plans and procedures. The terminology contained in the Glossary (Appendix 14, page 117) and the acronyms and abbreviations on pages vi-vii of this plan shall be used for this purpose by all concerned, except in cases where any of these terms are specifically redefined for special uses.

APPENDICES

APPENDIX 1
(Ref: Paragraph 1.2.1)

PROVINCE OF ONTARIO

NUCLEAR EMERGENCY PLAN

PARTS

Part	Plan
I	Provincial Master Plan
II	Pickering Nuclear Emergency Plan
III	Bruce Nuclear Emergency Plan
IV	Rolphton Nuclear Emergency Plan
V	Chalk River Nuclear Emergency Plan
VI	Enrico Fermi 2 Nuclear Emergency Plan
VII	Darlington Nuclear Emergency Plan
VIII	Transborder Nuclear Emergency Plan

APPENDIX 2
(Ref: Paragraph 1.3.2)

DESIGNATED NUCLEAR FACILITIES AND MUNICIPALITIES

Designated Nuclear Facility	**Designated Municipalities**
Pickering NGS	1. Region of Durham 2. Metropolitan Toronto
Bruce NPD	1. County of Bruce* 2. Township of Bruce 3. Township of Kincardine 4. Village of Tiverton
NPD NGS Rolphton	1. County of Renfrew* 2. Township of Rolph, Buchanan, Wylie and McKay 3. Township of Head, Clara and Maria
Chalk River Nuclear Laboratories	1. County of Renfrew* 2. Township of Rolph, Buchanan, Wylie and McKay 3. Village of Chalk River 4. Town of Deep River
Enrico Fermi 2 (Michigan, USA)	1. County of Essex* 2. Township of Malden 3. Town of Amherstburg
Darlington NGS	1. Region of Durham

*With the agreement of the other designated municipalities in the county, these counties should co-ordinate and assist in the plans of municipalities, including the employment of the resources of county departments and local boards. (Section 3(3) of the Emergency Plans Act, 1983 refers.)

APPENDIX 3
(Ref: Paragraph 2.6.3)

PROTECTIVE ACTION LEVELS (PALs)

The following Protective Action Levels shall be used in Ontario:

	Lower Level		Upper Level	
Measure	**Effective**	**Thyroid**	**Effective**	**Thyroid**
Sheltering	0.1 rem (1 mSv)	0.3 rem (3 mSv)	1 rem (10 mSv)	3 rem (30 mSv)
Evacuation	1 rem (10 mSv)	3 rem (30 mSv)	10 rem (100 mSv)	30 rem (300 mSv)
Thyroid Blocking	--	3 rem (30 mSv)	--	30 rem (300 mSv)
Banning Food/Water Consumption	0.05 rem (0.5 mSv)	0.15 rem (1.5 mSv)	0.5 rem (5 mSv)	1.5 rem (15 mSv)

Note: These PALs are expressed in terms of the highest projected dose likely to be received by the most exposed individual in the relevant critical group (see Glossary in Appendix 14 for these terms).

APPENDIX 4
(Ref: Paragraph 6.9.2)

EMERGENCY WORKER SAFETY

ANNEX A - GUIDELINES FOR ASSIGNING SAFETY STATUS

ANNEX B - PRECAUTIONARY MEASURES

ANNEX A
to APPENDIX 4

EMERGENCY WORKER SAFETY

GUIDELINES FOR ASSIGNING SAFETY STATUS

Safety Status	Projected Dose Rate (per hour)
RED	>2 rem (20 mSv)
ORANGE	>100 mrem (1 mSv) to 2 rem (20 mSv)
YELLOW	>2.5 mrem (0.025 mSv) to 100 mrem (1 mSv)
GREEN	≤ 2.5 mrem (0.025 mSv)

ANNEX B
to APPENDIX 4

EMERGENCY WORKER SAFETY

PRECAUTIONARY MEASURES

Safety Status	Precautionary Measures
RED	(1) Enter and exit Sector via Exposure Control Centre. Enter the sector only when accompanied by a qualified radiation control technician.
	(2) Carry self-reading pocket dosimeter and TLD badge. Check dosimeter every 15 minutes.
	(3) Exit from Sector if dosimeter reading reaches 9 rem (90 mSv) (or lower personal limit prescribed by Exposure Control Centre).
	(4) Observe any precautions prescribed by Exposure Control Centre, including taking stable iodine pills.
	(5) If duties permit, remain under shelter or inside vehicle.
	(6) Stay in sector limited to one hour at a time if no period prescribed by Exposure Control Centre.
ORANGE	(1) Enter and exit Sector via Exposure Control Centre.
	(2) Carry self-reading pocket dosimeter and TLD badge. Check dosimeter every 1/2 hour.
	(3) Exit from Sector if dosimeter reading reaches 9 rem (90 mSv) (or lower personal limit prescribed by Exposure Control Centre).
	(4) Observe any precautions prescribed by Exposure Control Centre, including taking stable iodine pills.

	(5) If duties permit, remain under shelter or inside vehicle. (6) Stay in Sector limited to four hours at a time if no period prescribed by Exposure Control Centre.
YELLOW	(1) Enter and exit Sector via Exposure Control Centre. (2) Carry self-reading pocket dosimeter and TLD badge. Check dosimeter every hour. (3) Exit from Sector if dosimeter reading reaches 9 rem (90 mSv) (or lower personal limit prescribed by Exposure Control Centre). (4) Observe any precautions prescribed by Exposure Control Centre, including taking stable iodine pills. (5) If duties permit, remain under shelter or inside vehicle. (6) Stay in Sector limited to the period, if any, prescribed by Exposure Control Centre.
GREEN	No precautions necessary. No limit on stay period.

APPENDIX 5
(Ref: Paragraph 5.2.1)

DECLARATION OF PROVINCIAL EMERGENCY

PROCEDURE

1. The Coordinator, Emergency Planning Ontario (or the Executive Director, Provincial Operations Centre) shall assess the actual or potential situation created by an emergency at a nuclear facility, and shall decide when the declaration of a Provincial emergency is necessary in order to adequately cope with this situation.

2. On the advice of the Coordinator, Emergency Planning Ontario (or the Executive Director, Provincial Operations Centre), the Solicitor General will recommend to the Premier the declaration of a Provincial emergency, and the area to which it should apply. A declaration in the form shown in Annex A will be presented to the Premier, through the Secretary of the Cabinet, for signature.

3. When signed, the declaration shall be promulgated by the Coordinator, Emergency Planning Ontario (or the Executive Director, Provincial Operations Centre) to the public through the media, and to the concerned ministries, agencies and municipalities through emergency telecommunications channels.

4. A record of the declaration and its promulgation shall be maintained by the Coordinator, Emergency Planning Ontario, who shall also arrange for the declaration to be published in the Ontario Gazette in due course.

5. If any of the officials mentioned above are not immediately available, then the requisite action shall be taken by their legal alternates or deputies.

ANNEX A to
APPENDIX 5

DECLARATION OF A PROVINCIAL EMERGENCY

WHEREAS I, ________________________________, Premier of Ontario, believe that circumstances make it necessary to declare an emergency under Section 7 of the Emergency Plans Act, 1983.

NOW THEREFORE, in exercise of the powers conferred upon me under Section 7(1) of the said Act, I do hereby declare that an emergency exists in (the whole Province of Ontario.) (the following parts of the Province of Ontario:)

FURTHER, under the provisions of Section 7(5) of the said Act, I do hereby designate __________________________________ (name) ____(ministerial designation) to exercise the powers conferred upon me by subsections (1), (2), (3) and (4) of Section 7 of the said Act.

SIGNED at _________________________________ (place) on
the ________ day of _________________________, 19___
at __________ (time).

____

Premier of Ontario

APPENDIX 6
(Ref: Paragraph 2.3.5)

PROTECTIVE MEASURES

1.0 This appendix discusses the various protective measures available in dealing with a nuclear emergency, their efficacy and limitations, and any disadvantages or problems associated with them. This discussion is intended to assist those responsible for deciding upon the use of these measures during an emergency. It also provides the rationale for the methods of implementation of these measures given in Appendix 7 (page 63).

1.1 Entry Control

1.1.1 It is desirable to prevent non-essential persons from entering a potential danger area. However, the unavailability of the large number of personnel needed to set up an effective system of roadblocks, or to control access at other points, would limit the effectiveness of this measure.

1.1.2 People wanting to rejoin their families, or return to their homes, would try to enter a potentially dangerous area. It is arguable whether they should be stopped unless acute hazards exist.

1.1.3 In view of these and other considerations, entry control should be applied as follows:

(a) It should only be enforced for areas evacuated by their inhabitants, for reasons of security and the possibility of undesirable levels of contamination.

(b) For all other areas where it is considered desirable, it should be recommended by public announcements and warning signs.

(c) Consideration should be given to closing main traffic routes (road and rail) passing through the Contiguous Zone of a nuclear facility as a precautionary measure in the early stages of a Category 3 notification, and these should remain closed until it is established that they are free of risk. Such main routes passing through the Primary Zone may also be closed at any stage if considered appropriate. Prior plans for rerouting traffic from such closed routes shall be made.

1.2 Protective Devices

1.2.1 Respirators and air-packs are available only in limited quantities, and should be issued, if required, to emergency personnel who work in the areas of greatest hazard.

1.2.2 Other workers and members of the general public can obtain some respiratory protection by covering the nose and mouth area with a crumpled or folded handkerchief, towel or similar article to avoid particulates.

1.2.3 An outer garment, preferably plastic, will protect the person's clothing and body from being contaminated by particulates outdoors and can be easily decontaminated after use.

1.3 Thyroid Blocking

1.3.1 This measure protects only against the radioiodine in an emission. It is fully effective if the stable iodine is ingested shortly before the person is exposed to the radioiodine. Progressively less protection is available as the taking of stable iodine is delayed, and there is very little benefit if the initial administration occurs 10-12 hours after a single exposure.

1.3.2 Very few people would suffer any side effects from taking stable iodine. However, with the dosages required for thyroid blocking, such effects would not be serious and would be transitory. Individuals allergic to iodine should be advised not to take stable iodine.

1.3.3 The major consideration with this measure arises from the need for timely application. As a result, detailed planning is required to ensure timely distribution of stable iodine pills to those people who could receive a significant dose to the thyroid as a result of a nuclear accident.

1.4 Sheltering

1.4.1 Sheltering provides protection against the plume (from both external exposure and inhalation) and deposited radioactivity. It is a relatively safe, quick and cheap protective measure. However, the amount of protection it provides is limited.

1.4.2 Gamma Cloud Source. A vehicle or a wood-frame house provides practically no shielding from a plume. Staying inside a masonry house or in a basement (even of a wood-frame house) reduces the dose received by about one-half. Sheltering inside a large office or industrial building would reduce the outdoor dose to one-third or even one-fifth.

1.4.3 Surface Source. An automobile or woodframe house reduces the dose from surface contamination by one-half. A house basement reduces it to one-twentieth, and a large building to one-hundredth or less.

1.4.4 Inhalation Dose. Reductions in dose would depend mainly on ventilation rates. Generally, in dwellings with windows and doors closed and ventilation turned off, good protection would be available for a short period (one hour or less), but due to normal air leakage none would be available after about two hours.

1.4.5 External Dose. The dose would depend on the shielding provided by the building, and also partially on the ventilation rates of the types of shelter discussed above.

1.4.6 Conclusion. In view of the above considerations, it may generally be concluded that:

(a) If a puff or a plume is of short duration, sheltering is very effective. It would also be fairly effective against a plume of longer duration if the main hazard was from external dose.

(b) If low-level doses are projected (in case of a small emission, or if variable wind conditions prevail during a large emission) sheltering may well provide an economical method of further reducing exposure.

(c) Sheltering, especially in suitable structures, would be effective shielding from ground contamination. However, either such contamination would have to be removed fairly soon, or the people in shelters evacuated, since long-term sheltering is impracticable.

(d) In certain situations, sheltering followed by evacuation may provide the optimum solution: if, for example, a large emission occurs with insufficient time to evacuate people before the plume arrives, or if it is safer to wait out adverse but transitory environmental conditions.

1.5 Evacuation

1.5.1 Generally, evacuation is the most effective method of avoiding exposure to radiation in a nuclear emergency. However, it is also the most difficult, costly and risky measure to implement, as well as being the most disruptive to individual and community life.

1.5.2 The costs and risks of evacuation can be considerably reduced by adequate prior planning and preparation. Studies have shown that emergency evacuations, even without much advance planning, are fairly safe operations. Traffic accident rates are much lower than normal.

1.5.3 Emergency planners and managers must take into account the likelihood that, once the emergency is known to have occurred, many people will leave the area spontaneously. Thus, an appropriate public information effort will be required to allay unnecessary alarm, and avoid evacuation. However, traffic control arrangements must be in place to ensure that the movement of people who do leave without instructions proceeds smoothly and safely.

1.5.4 Selective Evacuations. The advisability of this option must be carefully considered. If it appears likely that a certain sector may need to be evacuated later, it may be appropriate to undertake earlier evacuation of special groups like seriously ill patients in hospitals, bedridden or handicapped persons. However, the selective evacuation of a portion of the general population in a sector (such as pregnant women and young children) is very likely to trigger a general uncontrolled evacuation of the area, and should not normally be ordered.

1.6 Decontamination

1.6.1 Contamination could be caused by particulates and radioiodines in the emission. The need for decontamination depends, therefore, on their presence in the emission and the area in which they are, or may be, deposited, but this is likely to be difficult to determine in the early stages of an emergency.

1.6.2 Emergency workers will be routinely monitored and, if necessary, decontaminated under the safety system set up for them under this plan.

1.6.3 In the case of evacuees, personal monitoring and, if necessary, decontamination will be done at Decontamination Centres set up at Reception Centres. To minimize the likelihood of evacuees dispersing to their own destinations without being monitored first, Reception Centres should be located not far outside the Primary Zone, and the Traffic Control Plan should ensure that evacuee traffic does not exit from evacuation routes before reaching the designated Reception Centre, or being otherwise monitored.

1.6.4 Any substantial contamination of the environment would necessitate the development of a special decontamination plan as part of Restoration operations.

1.7 Food Chain Protection

1.7.1 To prevent radioactive material from entering the food chain the following measures are available:

(a) Pasture control
(b) Livestock control
(c) Produce and crop control
(d) Land control
(e) Decontamination

These measures are defined in the Glossary (Appendix 14).

1.7.2 Provided prior planning and preparation have been done, the imposition of such measures in a relatively small area should not present much of a problem, so long as individuals are fairly compensated for losses. However, if the measures are to be applied to a large area, then general economic costs, possible food shortages, and availability of alternative supplies are factors that will need to be weighed against the potential risk.

1.8 Food, Milk and Water Control

1.8.1 These measures are required to prevent the consumption of contaminated or radioactive food, milk and water.

1.8.2 On a small scale, imposition of these measures should not pose any great problem. But on a large scale, the resultant costs, shortages and so on will have to be weighed against the advantages of avoiding the projected risk.

APPENDIX 7
(Ref: Section 6.4)

IMPLEMENTATION OF PROTECTIVE ACTION

1.1 General

1.1.1 This appendix provides guidance on the methods of implementing various measures that may be required during Phase 1 of a nuclear emergency.

1.1.2 These measures are ordered by Response Sector, hence the planning for their implementation, and its execution, must also be on the same basis. (Where a boundary of a sector is a road, any measure implemented for that sector should apply to people living on both sides of the road).

1.1.3 The protective action considered in this appendix includes:

(a) Precautionary measures, namely, closing of recreation areas, suspension of school classes, suspension of work in offices, factories, etc., suspension of hospital admissions, and entry control.

(b) Sheltering.

(c) Thyroid blocking.

(d) Evacuation.

(e) Immediate preventive measures for Ingestion Control.

1.2 Closing of Recreation Areas

1.2.1 This measure could be ordered as a precautionary measure and will also form part of the implementation of Sheltering and Evacuation measures.

1.2.2 When this measure is implemented for any Sector(s), it requires the following:

(a) All persons on beaches or in parks, camping grounds, etc., should vacate them. (They should be advised of the best route or direction to take to move out of the area or the Primary Zone.)

(b) Such evacuated recreation areas should be closed, and suitable warning signs put up.

1.3 Suspension of School Classes

1.3.1 This measure requires regular classes to be suspended in schools and other educational institutions in the named Sector(s). The aim would be to permit parents, who so desired, to collect their children from school.

1.3.2 Schools shall maintain accurate records of students who have left the school. The remaining students could usefully rehearse drills for sheltering and evacuation in case these were required later on. Responsibility for these remaining students is that of the school until they are collected by their parents or permitted to go home after the emergency is over. This responsibility continues even when the school is evacuated, and lasts until all students are collected by their parents/guardians from the Reception Centre (see paragraph 1.9.4 (a) below).

1.4 Suspension of Work

1.4.1 This measure requires normal work to be suspended in industrial, commercial and related establishments and offices in the named Sector(s). The aim would be to enable workers in these establishments who wished to return home to rejoin their families to do so.

1.4.2 After this measure is ordered, the affected establishments should inform the designated municipal authority of the number of remaining workers who would need transport in case of an evacuation. Every effort should be made to fully utilize available private automobiles to reduce the requirement for additional transport.

1.5 Suspension of Hospital Admissions

1.5.1 This measure could be ordered as a precautionary measure and will also apply should the measure of Sheltering be implemented in the Sector containing that hospital.

1.5.2 This measure requires admissions of non-critical patients to be suspended in hospitals in the named Sector(s).

1.6 Entry Control

1.6.1 This measure could be ordered as a precautionary measure or a protective one. It would also form part of the implementation of Sheltering or Evacuation.

1.6.2 When ordered for any Sector(s) it would require:

(a) Announcements through the media advising the public not to enter the named Sector(s) unless they have pressing reasons to do so.

(b) Wherever possible, putting up warning signs to the above effect at entry points to the Sector(s).

1.6.3 When Sheltering is ordered for any Sector(s), the actions listed in paragraph 1.6.2 above would be automatically implemented for that area.

1.6.4 When Evacuation is ordered for any Sector(s), access will be totally restricted to that area except for:

(a) Emergency workers entering the area under instructions of the Municipal Control Group (MCG) or the Provincial OpsCentre. Such instructions would need to be communicated to the entry control posts set up around the area.

(b) In all other cases with the sanction of the MCG or Provincial OpsCentre, either in the form of a pass, or by a reference made to either body.

1.6.5 Entry control on main traffic routes passing through the Primary Zone shall be implemented as part of the Traffic Control Plan for the zone. For rail routes, the Ministry of Transportation & Communications will be the liaison between the railway operators and the Provincial Operations Centre.

1.6.6 Notification of the emergency shall be made to the Air Traffic Control organization by the Ministry of Transportation & Communications so that air traffic, especially low-flying aircraft, can be warned to stay out of the Primary Zone. Aircraft should not be permitted to fly below 2000 meters' height over this area.

1.7 Sheltering

1.7.1 This measure requires people to remain indoors and reduce external ventilation to the maximum extent possible. In houses, people should go into their basements. In certain situations, instructions might be issued for people in large buildings to also go down into basements.

1.7.2 The implementation of this measure in any Sector(s) would require the following:

(a) Notification to all residents in the area to adopt sheltering. This is dealt with in detail in paragraph 1.7.4 below.

(b) Closing of all recreation areas in the sector(s) (as per paragraph 1.2.2 above).

(c) Establishment of Entry Control for the area, as described in paragraph 1.6.2 above.

(d) Police patrolling of the area for the purpose of crime prevention, notifying any persons found outdoors of the sheltering advisory, assistance to residents in need, etc.

(e) Regular reporting on the situation in the area to the MCG, which will in turn keep the Provincial OpsCentre informed.

1.7.3 Sheltering cannot be enforced. People can only be advised to adopt it. It is likely that many people might want to leave the area within which Sheltering had been ordered. Such persons should generally not be stopped but should be enabled to leave the area expeditiously and in an appropriate direction.

1.7.4 Notification. Notifying people in any Sector(s) that Sheltering or Evacuation has been ordered for that area would generally require the following:

(a) Through a pre-arranged signal, convey warning of the need to adopt some protective measures.

(b) Based on information provided through the prior public education program, people would turn on radios/TVs to designated channels.

(c) These designated radio/TV stations will broadcast announcements given to them by the MCG or the Local or Provincial InfoCentre, as appropriate, regarding the measure required to be implemented.

(d) In the case of high-rise apartment buildings, either the internal loudspeaker/calling system should be used to alert residents, or the building superintendent with volunteer residents be asked to knock on doors.

(e) In the case of large office and industrial buildings, a system similar to the above would have to be employed.

(f) In the case of institutions (hospitals, schools, etc), a phone call to an appropriate pre-designated person should be adequate.

(g) In the case of evacuation, it would be advisable to carry out a confirmatory check to ensure everyone had received notification.

1.8 Thyroid Blocking

The implementation of this protective measure requires the timely distribution of stable iodine pills to the potentially affected population, and the issue of appropriate instructions when people in a particular sector are required to take pills.

1.9 Evacuation

1.9.1 If any Sector(s) needs to be evacuated, the people resident therein shall be moved out of the Primary Zone. The main evacuation route(s) for each Sector shall be laid down by the Province in an outline evacuation plan. Routes from within each Sector to reach the main evacuation route(s), and from these to the Reception Centre(s), shall be pre-selected by the municipality. The evacuation plan will also make an allocation of Sectors to host municipalities for purposes of harbouring the evacuated population of those Sectors.

1.9.2 Evacuation can be ordered in any Sector(s) in two ways:

(a) As a general evacuation. This would require all persons in the designated area to evacuate, except for any specified Special Groups who could not be safely moved, eg, seriously ill patients, bedridden residents of nursing homes, inmates of correctional institutions, etc. Such groups would be automatically required to adopt Sheltering in lieu of Evacuation, and also, if appropriate, Thyroid Blocking.

(b) As a selective evacuation. This would specify the group to be evacuated in anticipation of a general evacuation later. The selective evacuation of groups within the general population (eg, pregnant women and children), requiring a general broadcast of instructions, will not normally be ordered.

1.9.3 Evacuation ordered in any Sector(s) would require the following:

(a) Notification of the people in the area (or the institutions affected in case of selective evacuation). The method of notification would be as described in paragraph 1.7.4 above.

(b) Closing of all recreation areas in the sector(s) (as per paragraph 1.2.2 above).

(c) Institution of the required traffic control. This would be in the form of augmentation of the traffic control measures imposed at the earlier stages of the emergency.

(d) Provision of transportation to people who do not have their own, and to persons with special needs, eg, patients, the handicapped, etc. Arrangements (based on best estimates of the numbers involved) must be pre-planned. If municipal resources are insufficient, the MCG must obtain additional resources from other municipalities or from the Province. This, too, must be pre-arranged.

(e) Establishment of Entry Control for the area as detailed in paragraph 1.6.4 above.

(f) Minimum police patrolling of the area required to ensure crime prevention, assistance to persons unable to evacuate, etc.

(g) Regular reporting on the progress of the evacuation to the MCG, which will in turn keep the Provincial OpsCentre informed.

1.9.4 Evacuee Reception and Care. Arrangements for the reception and care of evacuees will be made by the host municipality to which they are allocated in the evacuation plan. This will require the setting up of one or more of each of the following facilities:

(a) Reception Centre. This is the Centre to which evacuees from a designated Sector will initially report. Even those persons who desire to find their own accommodation should first report to their allocated Reception Centre. The Reception Centre should be organized to perform the following functions:

  (i) Registration and Inquiry for all evacuees assigned to it.

  (ii) Allocate evacuees to one of the Evacuee Centres being serviced by it.

  (iii) Hold children evacuated from schools for collection by their parents.

  (iv) First aid.

  (v) Monitoring and, if necessary, decontamination of persons and their automobiles. A Decontamination Centre would be set up in or adjacent to the Reception Centre.

(b) Evacuee Centre. Evacuees allocated to an Evacuee Centre would be lodged, fed and cared for until they could return to their homes. If any persons desired to leave the Centre before this, their particulars should be reported to Registration and Inquiry at the appropriate Reception Centre.

1.9.5 Special Groups. Patients from hospitals, residents of nursing homes, correctional institution inmates, etc., in any Sector would be evacuated directly to appropriate facilities in the host municipality to which evacuees from that Sector had been allocated. This shall be pre-arranged. These evacuees must proceed via the Decontamination Centre at the appropriate Reception Centre.

1.10 Immediate Preventive Measures

Implementation of these measures (described in section 6.3, page 43) would require the following:

(a) The broadcast through the media of appropriate instructions. These directives should be prepared in advance.

(b) Supplementary advice and instructions to farmers and food producers through local offices of the Ministry of Agriculture & Food. These should also be prepared in advance.

(c) Issue of instructions to traffic control posts regarding bans on export of commodities.

(d) If necessary, the establishment of additional, pre-planned export control posts.

(e) Prior arrangements by the Ministry of Agriculture & Food for the clearance of dairy milk storages.

(f) Instructions to municipal water supply systems to close water intakes, if required.

(g) Carrying out of appropriate field monitoring. Priority shall be accorded to municipal water intakes, municipal water storages, and milk cleared from dairy storages.

APPENDIX 8
(Ref: Section 1.7)

RESPONSIBILITIES

The responsibilities of various Provincial Ministries and other bodies and organizations are shown as follows:

Annex A - Ministry of Agriculture and Food

Annex B - Ministry of Community & Social Services

Annex C - Ministry of Consumer & Commercial Relations

Annex D - Ministry of the Environment

Annex E - Ministry of Government Services

Annex F - Ministry of Health

Annex G - Ministry of Housing

Annex H - Ministry of Labour

Annex I - Ministry of Municipal Affairs

Annex J - Ministry of Natural Resources

Annex K - Ministry of the Solicitor General

Annex L - Ministry of Transportation & Communications

Annex M - Director of Emergency Information

Annex N - Atomic Energy of Canada Ltd.

Annex O - Ontario Hydro

Annex P - Designated Municipalities

Annex Q - Atomic Energy Control Board

ANNEX A
to APPENDIX 8

RESPONSIBILITIES

MINISTRY OF AGRICULTURE AND FOOD

Study and Research

1. Initiate and assist in studies and research on the radioactive contamination and decontamination of foodstuffs, crops, produce, agricultural land, etc.

Planning and Preparation

2. Assist in the development and implementation of a public education program insofar as it relates to farmers, food producers, etc.

3. Prepare plans for providing information and advice to food producers in the Primary Zone of each designated nuclear facility during the initial stages of an emergency. This includes preparation of advisories covering different situations.

4. Prepare plans for instituting immediate preventive measures in the Primary Zone of each designated nuclear facility.

5. Prepare plans for emergency supply of milk and/or vegetables to the Primary Zone (or part thereof) of each designated nuclear facility, in case consumption of local supplies is banned for any extended period.

6. Establish arrangements with Marketing Boards for dealing with any large-scale contamination of food supplies, including arranging sources of alternative supply.

7. Prepare operating procedures for the Ministry's Emergency Action Group, and make necessary organizational and administrative arrangements for the establishment of the Group and to enable it to carry out its functions.

8. Maintain an up-to-date information data-base relating to agricultural and food facilities, producers, marketing organizations, etc, for use in nuclear emergency planning and management. This data will be organized so as to allow access to information for the Primary Zone and each sub-sector of the Secondary Zone around each designated nuclear facility.

Provision of Personnel

9. Based upon requirements specified by the Ministry of the Solicitor General, recommend suitable Ministry personnel for staffing various positions in the Province's emergency management organization, including qualified personnel for the Ingestion Monitoring Organization to carry out field monitoring.

10. Provide suitable Ministry representatives to serve on the Operations Group of the Provincial Operations Centre and on the Phase 2 Advisory Committee.

Operations

11. Act as the main agency through which Ingestion Control operations in Phase 1 and 2 will be conducted.

12. Establish an Emergency Action Group in the Ministry to direct and coordinate Ministry actions under the direction of the Provincial Operations Centre during Phase 1. If appropriate, this group will continue functioning in Phase 2, and will receive direction from the Executive Authority.

13. As part of restoration operations, re-establish disrupted food supplies, etc, and assist in assessing compensation, if required.

Training

14. Participate in nuclear emergency exercises.

15. Ministry staff nominated to various elements of the emergency management organization shall participate in training arranged for them.

ANNEX B
to APPENDIX 8

RESPONSIBILITIES

MINISTRY OF COMMUNITY AND SOCIAL SERVICES

Study and Research

1. Assist in studies related to the management of nuclear emergencies.

Planning and Preparation

2. Participate in protective action planning for emergencies at designated nuclear facilities.

3. Assist the designated municipalities, if so requested by them, in making their emergency social service plans, and advise the Ministry of the Solicitor General on the status of these plans.

4. Ensure that appropriate Ministry offices have plans in place to assist the designated municipalities during an emergency.

5. Make plans for implementing protective measures in institutions operated by the Ministry and lying within the Primary Zone of designated nuclear facilities. Encourage institutions subsidized by the Ministry to make such plans.

6. Liaise with private social service organizations on their role in a nuclear emergency.

7. Prepare operating procedures for the Ministry's Emergency Action Group, and make the necessary organizational and administrative arrangements for the establishment of the Group and to enable it to carry out its functions.

Provision of Personnel

8. Provide suitable Ministry representatives to serve on the Operations Group of the Provincial Operations Centre and the Phase 2 Advisory Committee.

Operations

9. Establish an Emergency Action Group in the Ministry to direct and coordinate Ministry actions under the direction of the Provincial Operations Centre during Phase 1.

10. Assist affected municipalities in delivery of emergency social services.

11. During restoration operations, assist in re-establishment of social services and assessment of compensation.

Training

12. Participate in nuclear emergency exercises.

13. Ministry staff nominated to various elements of the emergency management organization shall participate in training arranged for them.

ANNEX C
to APPENDIX 8

RESPONSIBILITIES

MINISTRY OF CONSUMER AND COMMERCIAL RELATIONS

Provision of Personnel

1. If and when required, the Chief Engineer, Pressure Vessels, will join the Technical Group of the Provincial Operations Centre.

Operations

2. During a nuclear emergency, discharge its responsibilities under the Boilers and Pressure Vessels Act relating to the nuclear facility involved, through the mechanism of the Provincial Operations Centre, and under the direction of the Executive Authority.

ANNEX D
to APPENDIX 8

RESPONSIBILITIES

MINISTRY OF THE ENVIRONMENT

Study and Research

1. Assist in studies and research on meteorology and hydrology as applicable to nuclear emergencies, especially in the fields of meteorological and radionuclide dispersion forecasting.

2. Assist in studies and research on other relevant aspects of nuclear emergencies and emergency management.

Planning and Preparation

3. Prepare and maintain in suitably accessible form, a data-base on meteorological and hydrological patterns affecting the designated nuclear facility locations, to assist in environmental forecasting during a nuclear emergency.

4. Prepare and maintain a data-base on drinking water supplies and systems, by sub-sectors of the Secondary Zone of each designated nuclear facility.

5. Assist the Ministry of Labour in maintaining an environmental radiation data-base.

6. Prepare plans for water control, by sub-sector, for the Secondary Zone of each of the designated nuclear facilities.

Provision of Personnel

7. Based upon requirements specified by the Ministry of the Solicitor General, recommend suitable Ministry personnel for staffing various positions in the Province's emergency management organization, including qualified personnel for the Ingestion Monitoring Organization, to carry out field monitoring.

8. Provide suitable Ministry representatives to serve on the Operations Group of the Provincial Operations Centre and on the Phase 2 Advisory Committee.

Operations

9. Provide meteorological and hydrological data and forecasts to the emergency management organization.

10. Under the direction of the Provincial Operations Centre and, later, the Executive Authority, implement water control measures based on plans already made.

11. During restoration operations, provide technical advice to assist in re-establishing affected water supplies.

Training

12. Participate in nuclear emergency exercises.

13. Ministry staff nominated to various elements of the emergency management organization shall participate in training arranged for them.

ANNEX E
to APPENDIX 8

RESPONSIBILITIES

MINISTRY OF GOVERNMENT SERVICES

Study and Research

1. Assist in studies on telecommunications, data processing and computer systems requirements of the emergency management organization.

Infrastructure

2. Furnish, equip and maintain the Provincial Operations and Information Centres.

3. Co-ordinate arrangements for the provision of emergency communications not being provided by Ontario Hydro.

4. Maintain and house the Ministry of Labour trailer used as a Field Headquarters.

Operations

5. Transport the Field Headquarters trailer to its operational site(s).

ANNEX F
to APPENDIX 8

RESPONSIBILITIES

MINISTRY OF HEALTH

Study and Research

1. Carry out and assist in studies and research on the public and mental health implications of nuclear emergencies.

2. Assist in studies on protective action during a nuclear emergency.

Planning and Preparation

3. Participate in protective action planning for emergencies at the designated nuclear facilities.

4. Assist Medical Officers of Health of the designated municipalities in making emergency plans for their areas.

5. Evaluate plans of medical institutions lying within the Primary Zones of the designated nuclear facilities to implement various protective measures, and advise the Ministry of the Solicitor General on the adequacy of these plans.

6. Provide necessary guidance and training to medical institutions, ambulance services and other personnel on handling and treating radiologically contaminated persons.

Provision of Personnel

7. Provide suitable Ministry representatives to serve on the Operations Group of the Provincial Operations Centre, and the Phase 2 Advisory Committee.

Operations

8. Carry out operational co-ordination of ambulance services, hospitals and public health resources to meet the requirements of the emergency, under the direction of the Provincial Operations Centre and, later, the Executive Authority.

9. During Restoration operations, assist in making the required arrangements for special medical check-ups, treatment, counselling, etc, for the affected population.

Training

10. Participate in nuclear emergency exercises.

ANNEX G
to APPENDIX 8

RESPONSIBILITIES

MINISTRY OF HOUSING

Provision of Personnel

1. Provide a suitable Ministry representative on the Phase 2 Advisory Committee.

Operations

2. If called upon to do so, the Ministry shall arrange accommodation for evacuated people who cannot return to their homes for some time due to radiation contamination, etc.

Training

3. Participate in nuclear emergency exercises.

RESPONSIBILITIES

MINISTRY OF LABOUR

Administration

1. Provide administrative support to the Ingestion Monitoring Organization, to include arrangements for field accommodation and food when deployed (in an emergency or training).

Infrastructure

2. Provide laboratory facilities, both fixed and mobile, for radio-analysis of samples of air, water, soil, herbage, milk, foodstuffs, etc.

3. Provide a fully-equipped mobile communications and office trailer to serve as field headquarters for the Ingestion Monitoring Organization.

4. Provide protective clothing and equipment, and personal dosimeters for all Provincial Government personnel participating in Ingestion Control field monitoring.

5. Equip, maintain and operate an adequate network of fixed radiological monitoring sites in the Secondary Zones of all the designated nuclear facilities and trans-border nuclear power plants which could affect the Province.

6. Provide the necessary equipment for the functioning of the Ingestion Monitoring Organization.

Study and Research

7. Undertake research and studies in the area of radiation monitoring and analysis.

8. Assist in studies and research in the general area of nuclear emergencies, their effects and their management.

Planning and Preparation

9. Prepare and maintain plans for the carrying out of the tasks assigned to the Ingestion Monitoring Organization in the Province's Nuclear Emergency Plan in relation to each nuclear facility covered therein.

10. Prepare and maintain technical manuals, operating procedures and notification lists for the Ingestion Monitoring Organization.

11. Maintain, in suitably accessible form, an environmental radiation data-base. The Ministry of the Environment will assist.

Provision of Personnel

12. Based upon requirements specified by the Ministry of the Solicitor General, recommend suitable Ministry personnel for staffing various positions in the Province's emergency management organization, including the Ingestion Monitoring Organization.

Operations

13. The operational efficiency and effectiveness of the Ingestion Monitoring Organization shall be the responsibility of the Ministry.

14. The Radiation Protection Laboratory shall provide the required analysis facilities to support the Province's Nuclear Emergency Plan.

15. Monitor emissions of radioactivity from all nuclear power plants and alert the Coordinator, Emergency Planning Ontario, if limits laid down by the Atomic Energy Control Board are exceeded.

Training

16. The Ministry shall be responsible for the training of the Ingestion Monitoring Organization, including personnel from other ministries.

17. Participate in nuclear emergency exercises.

ANNEX I
to APPENDIX 8

RESPONSIBILITIES

MINISTRY OF MUNICIPAL AFFAIRS

Provision of Personnel

1. Provide a suitable Ministry representative on the Phase 2 Advisory Committee.

Operations

2. During Restoration operations, the Ministry shall assist municipalities in restoring conditions to normal, and, if required to do so, in the assessment and payment of compensation.

Training

3. Participate in nuclear emergency exercises.

ANNEX J
to APPENDIX 8

RESPONSIBILITIES

MINISTRY OF NATURAL RESOURCES

Infrastructure

1. Provide Ministry aircraft, if required, during a nuclear emergency.

2. Provide Ministry communications, if required, as a back-up for emergency communications.

Planning and Preparation

3. Establish procedures to evacuate Provincial Parks and Conservation Areas that lie within the Primary Zones of the designated nuclear facilities.

4. Establish procedures to provide Ministry aircraft, if required, during a nuclear emergency.

5. Establish procedures to employ Ministry communications as back-up.

6. Accord priority to mapping and air photography requirements for nuclear emergency planning and management.

7. Provide maps and topographical data as required.

Provision of Personnel

8. Based upon requirements specified by the Ministry of the Solicitor General, recommend suitable Ministry personnel for staffing various positions in the Province's emergency management organization.

9. Provide a suitable Ministry representative to serve on the Operations Group of the Provincial Operations Centre.

Operations

10. Carry out the evacuation and closing of any of the parks mentioned in paragraph 3 above when so ordered by the Provincial Operations Centre, or if required by this plan.

11. Provide Ministry aircraft, communications, and other resources if required by the Provincial Operations Centre, or later, the Executive Authority.

Training

12. Participate in nuclear emergency exercises.

ANNEX K
to APPENDIX 8

RESPONSIBILITIES

MINISTRY OF THE SOLICITOR GENERAL

Administration

1. Provide administrative support to the Operations Group of the Provincial Operations Centre.

2. Provide administrative support to the committees set up under this plan.

Study and Research

3. Arrange for studies and research to be carried out in the area of nuclear emergency effects, planning and management.

4. Remain abreast of the "state of the art and science" in this area.

Planning and Preparation

5. Keep the Province's Nuclear Emergency Plan updated.

6. Administer the Province's Nuclear Emergency Plan and supervise its implementation.

7. Monitor, co-ordinate and assist in the formulation of the nuclear emergency plans of the designated municipalities and Provincial ministries and agencies.

8. Ensure the establishment of an adequate alerting and notification system for nuclear emergencies.

9. Ensure that the infrastructure required to implement the Province's Nuclear Emergency Plan is available and kept in operational readiness.

10. Ensure that the planning data-base required to implement the Province's Nuclear Emergency Plan is available and is kept up-to-date.

11. Monitor and assess the operational readiness and effectiveness of all elements of the emergency management organization, including those of municipalities, Provincial ministries and agencies, nuclear facilities and facility operators, and make recommendations for improvement, where necessary.

12. Ensure that an adequate program of public education is implemented by facility operators for populations likely to be affected by a nuclear emergency.

13. The Ontario Provincial Police shall ensure that it maintains adequate plans and preparations to carry out its operational role in a nuclear emergency.

Provision of Personnel

14. Lay down, after appropriate consultation, the requirements and qualifications of personnel required to staff the emergency management organization, and select suitable persons for it.

15. Provide suitable persons to staff appropriate positions in the emergency management organization.

16. Ontario Provincial Police

    (a) Provide a suitable representative to serve on the Operations Group of the Provincial Operations Centre.

    (b) Recommend suitable personnel to fill required positions in the emergency management organization.

    (c) Be prepared to provide personnel to reinforce police forces of designated municipalities.

Operations

17. If so designated, the Solicitor General will exercise the emergency powers of the Premier and will provide overall control and direction to the emergency management operation.

18. The Coordinator, Emergency Planning Ontario, shall act as Executive Director of the Provincial Operations Centre, and will chair the Phase 2 Advisory Committee.

19. The Ontario Provincial Police shall provide assistance and resources in emergency management as directed by the Provincial Operations Centre and the Executive Authority.

Training

20. Prepare and issue an annual exercise program for the whole emergency management organization.

21. Conduct full-scale exercises and exercises of important parts of the organization.

22. Monitor and assess the training of all elements of the emergency management organization, including those belonging to municipalities and Provincial ministries and agencies.

ANNEX L
to APPENDIX 8

RESPONSIBILITIES

MINISTRY OF TRANSPORTATION AND COMMUNICATIONS

Infrastructure

1. Accord priority to maintaining and keeping open roads, including municipal roads, earmarked as evacuation routes in nuclear emergency plans.

2. Provide Ministry communications, if required, as a back-up for emergency communications.

Study and Research

3. Assist in studies on the evacuation of areas around designated nuclear facilities.

Planning and Preparation

4. Assist in the making of evacuation plans by the Ministry of the Solicitor General and municipalities in case of nuclear emergencies.

5. Prepare Standard Operating Procedures for the Ministry Emergency Action Group.

6. Establish procedures to employ Ministry communications as back-up emergency communications.

Provision of Personnel

7. Provide a suitable Ministry representative to serve on the Operations Group of the Provincial Operations Centre and act as liaison between the Ministry and the Centre.

Operations

8. Establish an Emergency Action Group in the Ministry to maintain liaison with and coordinate, under the direction of the Provincial Operations Centre, the operations of rail companies, GO Transit, air traffic control and telecommunication common carriers, which may be affected by the emergency, or which could furnish assistance in dealing with it.

9. Inform the Provincial Operations Centre immediately upon the closing of any roads (including municipal roads) earmarked as evacuation routes in plans, and suggest alternatives.

10. If required by the Provincial Operations Centre, the Ministry will arrange for route clearance, road maintenance, diversions, etc.

11. Provide Ministry communications and other resources, if required, by the Provincial Operations Centre.

12. Assist in Restoration operations, if required.

Training

13. Participate in nuclear emergency exercises.

ANNEX M
to APPENDIX 8

RESPONSIBILITIES

DIRECTOR OF EMERGENCY INFORMATION

Planning and Preparation

1. Prepare and maintain the Information Plan for nuclear emergencies.

2. Prepare and maintain the operating procedures required to implement the Information Plan.

3. Provide input into the development of public education programs by nuclear facility operators.

4. Monitor the implementation of public education programs and advise the Solicitor General on their effectiveness.

5. Prepare and periodically issue staffing and notification lists for the Provincial Information Centre and Local Information Centres.

Provision of Personnel

6. In consultation with Directors of Communication of ministries, nuclear facility operators and municipalities concerned, select suitable staff for the Provincial Information Centre and Local Information Centres.

Operations

7. Act as Director of Information in the Provincial Operations Centre, and as a member of the Phase 2 Advisory Committee.

8. Carry out other operational tasks assigned in this plan and the Information Plan.

9. Be responsible for the over-all efficiency and effectiveness of the whole emergency information organization and operation.

Training

10. Arrange requisite training for the staff selected for the information organization.

11. Assist the Ministry of the Solicitor General in planning, arranging and assessing the information aspects of nuclear emergency exercises.

12. Participate in nuclear emergency exercises.

ANNEX N
to APPENDIX 8

RESPONSIBILITIES

ATOMIC ENERGY OF CANADA LIMITED

(AECL has agreed to accept the following responsibilities, subject to negotiation and mutual agreement on their implications)

Infrastructure

1. Provide and maintain the facilities required to carry out the responsibilities assigned to it under this plan and subordinate procedures, including offsite field monitoring, onsite meteorological measurements, source term (emission) assessments, and provision of the technical components of exposure control centres and decontamination centres.

Study and Research

2. Assist the Province in carrying out studies and research in areas relevant to nuclear emergencies and their management.

Planning and Preparation

3. Establish the organization and procedures necessary to meet its responsibilities under this plan.

4. Assist the Province and designated municipalities in their planning and preparations to deal with a nuclear emergency at its Chalk River Nuclear Laboratories.

5. Design and implement a program of public education, as agreed with the Province, for the population living around its Chalk River facility.

Provision of Personnel

6. Under prior agreement with the Province, provide suitable personnel for staffing certain positions in the Province's emergency management organization.

7. In case of a nuclear emergency at the Chalk River facility, provide a management representative to serve on the Operations Group of the Provincial Operations Centre and on the Phase 2 Advisory Committee.

8. Assign personnel for carrying out the functions and responsibilities accepted by it under this plan.

9. Provide the Municipal Control Group for the Chalk River Facility's Primary Zone with a technical liaison officer during Phase 1 of the emergency.

Operations

10. Ensure that the Chalk River facility carries out the operational responsibilities assigned in Chapter 5.

11. Carry out the emergency information responsibilities assigned to the nuclear facility operator in Chapter 5.

12. Assist the Province and the affected municipalities in dealing with the offsite effects of a nuclear emergency at the Chalk River facility.

Training

13. Ensure that AECL personnel required to perform any of the tasks within its responsibilities are suitably trained.

14. Participate in nuclear emergency exercises conducted by the Province and designated municipalities for Chalk River Nuclear Laboratories.

15. Assist the Province in setting up and conducting exercises dealing with a nuclear emergency at Chalk River Nuclear Laboratories.

ANNEX O
to APPENDIX 8

RESPONSIBILITIES

ONTARIO HYDRO

Infrastructure

1. Provide agreed upon dedicated communication links required for this plan in relation to Ontario Hydro facilities.

2. Provide and maintain agreed upon facilities for radiological monitoring, onsite meteorological measurements, source term (emission) assessment, provision of monitoring equipment to decontamination centres and exposure control centres for emergency workers, and provision of stable iodine compounds.

Study and Research

3. Carry out and sponsor agreed upon studies and research in the area of offsite effects of nuclear emergencies, and the techniques, procedures and measures required to deal with them.

4. Co-operate with the Province in carrying out Provincially-sponsored studies by providing agreed upon technical assistance and personnel.

Planning and Preparation

5. Establish and maintain the organization and procedures within Ontario Hydro necessary to meet the requirements of the Province's Nuclear Emergency Plan.

6. Assist the Province and the municipalities in their planning and preparations to deal with a nuclear emergency at one of Ontario Hydro's nuclear stations.

7. Design and implement a program of public education, as agreed with the Province, for the populations living around Ontario Hydro nuclear stations.

8. Provide assistance to the Province and municipalities in the preparation/maintenance of technical and operating procedures.

Provision of Personnel

9. Based upon the requirements specified by the Province, recommend suitable personnel for staffing various positions in the Province's emergency management organization.

10. Provide representatives to serve on the Operations Group of the Provincial Operations Centre and the Phase 2 Advisory Committee.

11. Assign personnel for carrying out the functions and responsibilities allocated to Ontario Hydro in the Province's Nuclear Emergency Plan.

12. Provide each Municipal Control Group of municipalities in the Primary Zone with a technical liaison officer during Phase 1 of the emergency.

13. Provide a radiation monitoring service to the Ingestion Monitoring Organization.

Operations

14. Assist the Province and the affected municipalities in dealing with the emergency in all phases.

15. Carry out the operational responsibilities assigned in Chapter 5.

16. Carry out the emergency information responsibilities assigned to the nuclear facility operator in Chapter 5.

17. It is recognized that by virtue of their 24-hour availability at the site and their training and experience, Ontario Hydro staff at nuclear facilities will support and provide recommendations for protective action to the appropriate municipal authorities who have responsibility for directing such actions, until the Province takes over operational control.

18. Ontario Hydro, under licence of the regulatory authority of the Atomic Energy Control Board, has the responsibility for onsite emergency action and plant operation, to ensure integrity of the reactor systems and thereby maximize the protection of the public. Ontario Hydro will consult with, and seek agreement of, the Provincial Executive Authority on all onsite actions which would significantly, adversely affect dose to members of the public, except where time does not permit this because prompt actions, such as those to ensure personnel safety, are necessary.

Training

19. Ensure that personnel required to perform any of the tasks within Ontario Hydro's responsibilities are suitably trained.

20. Participate in nuclear emergency exercises conducted by the Province and municipalities.

21. Assist the Province in setting up nuclear emergency exercises and conducting them.

ANNEX P
to APPENDIX 8

RESPONSIBILITIES

DESIGNATED MUNICIPALITIES

(With the assistance of County Departments and Local Boards)

Infrastructure

1. Ensure availability of the essential facilities, plant and equipment required by municipal agencies to deal with a nuclear emergency.

Planning and Preparation

2. Prepare a municipal plan and procedures for dealing with nuclear emergencies. This plan shall be based upon the Province's Nuclear Emergency Plan. (See note below).

3. Establish detailed plans and procedures for implementing any protective measure in each Response Sector individually, or in a number (or all) of them simultaneously.

4. Maintain a planning data-base of information concerning the municipality to include demographic data, institutional data, resource inventory, etc.

5. Advise and assist the facility operator in developing and implementing a public education program where required.

Provision of Personnel

6. Provide suitable representatives to serve on the Operations Group of the Provincial Operations Centre, and the Phase 2 Advisory Committee.

Operations

7. Carry out the operational responsibilities assigned to municipalities in Chapter 5.

8. Carry out the emergency information responsibilities assigned to municipalities in Chapter 5.

Training

9. Ensure that all municipal personnel assigned any functions under nuclear emergency plans are suitably trained for their tasks.

10. Arrange exercises and practices to rehearse municipal plans and procedures.

11. Participate in nuclear emergency exercises arranged by the Province.

Note: Where a number of smaller municipalities are required to form a joint Municipal Control Group (as per paragraph 4.2.6, page 25), they shall prepare a joint plan, and implement it jointly.

ANNEX Q
to APPENDIX 8

RESPONSIBILITIES

ATOMIC ENERGY CONTROL BOARD

(The AECB has agreed to perform the following role in assisting the Province in nuclear emergencies)

Study and Research

1. Make available to the Province the results of its studies and research with a bearing on offsite safety.

2. Within available resources, participate in such studies and research undertaken by the Province.

3. Provide the Province with, or assist the Province in obtaining, information, studies and research literature, having a bearing on offsite safety, originating in international agencies, other countries, and other provinces of Canada.

Planning and Preparation

4. Provide the Province with technical advice and assistance in formulating its offsite safety plans and preparations.

5. Inform the Province whenever a nuclear facility in Ontario is being considered for licensing, and ensure that the Province has an opportunity to review and comment upon the facility's onsite and offsite emergency plans before a licence is issued.

Provision of Personnel

6. During exercises and actual nuclear emergencies, provide to the Province a pre-designated reactor specialist to be a member of the Technical Assessment Section.

7. Provide additional technical personnel and resources, as available, to the Province on request through the Federal Nuclear Emergency Control Centre.

Operations

8. Notify the Province, as soon as possible, of any report received by it from a nuclear facility in Ontario of an occurrence which has resulted, or is likely to result, in receipt by any person offsite of a dose of ionizing radiation in excess of prescribed regulatory limits.

9. During the course of a nuclear emergency, provide the Province with the results of any assessments carried out by it relating to current and future onsite conditions which have, or are likely to have, offsite implications, especially those relating to estimation of the source term.

10. The AECB representative in the Technical Assessment Section will contact the AECB inspector in the affected plant, if necessary, to request additional information or clarification of information received on measures being taken to deal with the problem.

11. The AECB representative will provide technical information and advice to the Technical Assessment Section to assist it in performing its functions.

12. In case the Province and the AECB, in consultation, consider that the timing and/or scope of any proposed action by the facility staff should be modified to decrease possible offsite effects of such action, the AECB will issue the necessary instructions or emergency orders to the facility operator.

Training

13. AECB will participate in training exercises held by the Province, subject to other priority commitments.

APPENDIX 9
(Ref: Paragraph 3.3.3)

PROVINCIAL NUCLEAR EMERGENCY PLAN COMMITTEES

This appendix contains a summary of the standing committees that shall be set up by the Solicitor General under this plan to maintain optimum standards in nuclear emergency planning and preparedness:

Annex A:	Plan Review & Preparedness Committee
Annex B:	Technical Advisory Committee
Annex C:	Technical Sub-committees
Annex D:	Regional Nuclear Preparedness Committees

ANNEX A
to APPENDIX 9

PLAN REVIEW AND PREPAREDNESS COMMITTEE

Terms of Reference

1. Keep the Provincial Nuclear Emergency Plan under review.
2. Keep under review the state of preparedness in the Province to deal with nuclear emergencies.
3. Review the report on every major exercise conducted under the Plan, and make recommendations, where appropriate.
4. Where necessary, make appropriate recommendations to the Solicitor General, through the Coordinator, Emergency Planning Ontario, to improve the state of nuclear emergency preparedness, or to make desirable changes or amendments to the Plan.
5. The Committee shall meet at least once every six months.
6. The Committee shall submit an annual report to the Solicitor General.

Composition

Chairman:	Head, Plans and Operations Emergency Planning Ontario (EPO)
Members:	Chairman, Technical Advisory Committee
	Head, Technical Group, Provincial Operations Centre
	Director of Emergency Information
	Director, Public Relations, Ontario Hydro
	Chairman, Ontario Hydro Nuclear Emergency Planning Coordinating Committee
	Representative, Atomic Energy of Canada Limited
	Chairmen, Regional Preparedness Committees
	Staff member, EPO (Secretary)

ANNEX B
to APPENDIX 9

TECHNICAL ADVISORY COMMITTEE

Terms of Reference

1. Keep under review the technical aspects of nuclear emergency planning and preparedness.
2. Provide advice to the Solicitor General on technical matters relating to nuclear emergencies, on its own initiative, and on issues referred to it.
3. Make, whenever deemed appropriate, specific recommendations to the Solicitor General on desirable technical improvements in nuclear emergency planning, preparedness and procedures.
4. Recommend to the Solicitor General any research or study program or project deemed desirable.
5. The Committee shall meet at least once every six months.
6. The Committee shall submit an annual report to the Solicitor General.

Composition

Chairman: Nominated by the Solicitor General

Members: Head, Technical Group, Provincial Operations Centre

Head, Plans & Operations, Emergency Planning Ontario

Representative, Ontario Hydro (health physics expertise)

Representative, Ontario Hydro (reactor systems expertise)

Representative, Atomic Energy of Canada Limited

Chairmen, Technical Sub-Committees

Staff member, Emergency Planning Ontario (Secretary)

Technical Experts (as required)

ANNEX C
to APPENDIX 9

TECHNICAL SUB-COMMITTEES

Based on the advice of the Technical Advisory Committee, sub-committees shall be set up in some or all of the following areas:

(a) Meteorology and Meteorological Models
(b) Dosimetry and Dose Projection Models
(c) Source Term (radioactive emissions during an emergency)
(d) Protective Measures
(e) Computer Applications
(f) Any other areas of interest.

Terms of Reference

1. Each sub-committee shall keep under review technical developments in its assigned area.

2. Each sub-committee shall provide advice to the Chairman, Technical Advisory Committee, on matters relating to its subject area, either on its own initiative, or on issues referred to the sub-committee.

3. Recommend to the Technical Advisory Committee any research or study program or project deemed desirable in its area.

4. Recommend to the Technical Advisory Committee any desirable technical improvements in nuclear emergency planning, preparedness and procedures.

5. Each sub-committee shall meet at least once every six months.

6. Each sub-committee shall submit an annual report to the Technical Advisory Committee.

Composition

The sub-committees will be composed of experts in the relevant area selected from Provincial ministries and agencies, Ontario Hydro, AECL, universities and private agencies. Individuals from Federal ministries and agencies may also be invited to become members.

ANNEX D
to APPENDIX 9

REGIONAL NUCLEAR PREPAREDNESS COMMITTEES

One such committee shall be established for each of the designated nuclear facilities. However, for Pickering NGS two committees shall be formed, one for Metropolitan Toronto and the other for the Region of Durham.

Terms of Reference

1. Keep under review the state of preparedness in the region around the nuclear facility to deal with an emergency.
2. Consider proposals to improve preparedness referred to the committee.
3. Where necessary, make appropriate recommendations to the Head(s) of Council of municipalities concerned and the Coordinator, Emergency Planning Ontario, to improve the state of nuclear emergency preparedness in the region.
4. Each committee shall meet at least once every six months.
5. Each committee shall submit an annual report to the Provincial Plan Review and Preparedness Committee.

Composition

Chairman: Staff Member
Emergency Planning Ontario

Members: Representative of Municipal Control Group

Representative, Municipal Police department

Representative, Municipal Social Services department

Medical Officer of Health, or representative

Representatives, Boards of Education

Representative, Area/Region, Ministry of Community & Social Services

Local Representative, Ministry of Agriculture & Food

Regional Manager, Emergency Health Services, Ministry of Health, or representative

Local Representative, Ministry of Transportation & Communications

Manager, Nuclear Facility (or representative)

Community/Public Relations Officer, Nuclear Facility

Coordinator, Local Information Centre

Special Representatives (as appropriate).

APPENDIX 10
(Ref: Paragraph 1.4.1)

EXTRACTS

EMERGENCY PLANS ACT, 1983

* * *

Administration of Act

2. The Solicitor General is responsible for the administration of this Act.

Municipal emergency plan

3.—(1) The council of a municipality may pass a by-law formulating or providing for the formulation of an emergency plan governing the provision of necessary services during an emergency and the procedures under and the manner in which employees of the municipality and other persons will respond to the emergency.

Moneys

(2) A by-law passed under subsection (1) may provide for moneys associated with the formulation and implementation of the emergency plan.

Co-ordination by county

(3) The council of a county may with the consent of the councils of the municipalities situated within the county co-ordinate and assist in the formulation of their emergency plans under subsection (1).

Emergency plan may be required

(4) The Lieutenant Governor in Council may designate municipalities that shall have an emergency plan respecting the type of emergency specified in the designation and, where so designated, a municipality shall formulate or provide for the formulation of the emergency plan.

Declaration of emergency

4.—(1) The head of council of a municipality may declare that an emergency exists in the municipality or in any part thereof and may take such action and make such orders as he considers necessary and are not contrary to law to implement the emergency plan of the municipality and to protect property and the health, safety and welfare of the inhabitants of the emergency area.

Declaration as to termination of emergency

(2) The head of council or the council of a municipality may at any time declare that an emergency has terminated.

Solicitor General to be notified

(3) The head of council shall ensure that the Solicitor General is notified forthwith of a declaration made under subsection (1) or (2).

Premier may declare emergency terminated

(4) The Premier of Ontario may at any time declare that an emergency has terminated.

* * *

Declaration of emergency

7.—(1) The Premier of Ontario may declare that an emergency exists throughout Ontario or in any part thereof and may take such action and make such orders as he considers necessary and are not contrary to law to implement the emergency plans formulated under section 6 or 8 and to protect property and the health, safety and welfare of the inhabitants of the emergency area.

Power of Premier

(2) For the purposes of subsection (1), the Premier of Ontario may exercise any power or perform any duty conferred upon a minister of the Crown or a Crown employee by or under an Act of the Legislature.

Emergency powers

(3) Where a declaration is made under subsection (1) and the emergency area or any part thereof is within the jurisdiction of a municipality, the Premier of Ontario may, where he considers it necessary, direct and control the administration, facilities and equipment of the municipality to ensure the provision of necessary services in the emergency area, and, without restricting the generality of the foregoing, the exercise by the municipality of its powers and duties in the emergency area, whether under an emergency plan or otherwise, is subject to the direction and control of the Premier.

Assistance

(4) The Premier of Ontario may require any municipality to provide such assistance as he considers necessary to an emergency area or any part thereof that is not within the jurisdiction of the municipality, and may direct and control the provision of such assistance, and the Lieutenant Governor in Council may authorize the payment of the cost thereof out of the Consolidated Revenue Fund.

Premier may designate minister

(5) Where the Premier of Ontario makes a declaration under subsection (1), he may designate a minister of the Crown to exercise the powers conferred on the Premier by subsections (1), (2), (3) and (4).

Counties, local boards and local services boards included

(6) For the purposes of this section, "municipality" includes a local board of a municipality, a county and a local services board.

Lieutenant Governor in Council to formulate plan

8. The Lieutenant Governor in Council shall formulate an emergency plan respecting emergencies arising in connection with nuclear facilities, and any provisions of an emergency plan of a municipality respecting such an emergency shall conform to the plan formulated by the Lieutenant Governor in Council and are subject to the approval of the Solicitor General and the Solicitor General may make such alterations as he considers necessary for the purpose of co-ordinating the plan with the plan formulated by the Lieutenant Governor in Council.

What plan may provide

9. An emergency plan may,

(a) in the case of a municipality, authorize employees of the municipality or, in the case of a plan formulated under section 6 or 8, authorize Crown employees to take action under the emergency plan where an emergency exists but has not yet been declared to exist;

(b) specify procedures to be taken for the safety or evacuation of persons in an emergency area:

(c) in the case of a municipality, designate one or more members of council who may exercise the powers and perform the duties of the head of council under this Act or the emergency plan during the absence of the head of council or his inability to act;

(d) establish committees and designate employees to be responsible for reviewing the emergency plan, training employees in their functions and implementing the emergency plan during an emergency;

(e) provide for obtaining and distributing materials, equipment and supplies during an emergency; and

(f) provide for such other matters as are considered necessary or advisable for the implementation of the emergency plan during an emergency.

Public access to plans

10. An emergency plan formulated under section 3, 6 or 8 shall be made available to the public for inspection and copying during ordinary business hours at an office of the municipality, ministry or branch of government, as the case may be.

Protection from personal liability

11.—(1) No action or other proceeding for damages lies or shall be instituted against a member of council, an employee of a municipality, a minister of the Crown or a Crown employee for doing any act or neglecting to do any act in good faith in the implementation or intended implementation of an emergency plan or in connection with an emergency.

* * *

Right of action

12. Where money is expended or cost is incurred by a municipality or the Crown in the implementation of an emergency plan or in connection with an emergency, the municipality or the Crown, as the case may be, has a right of action against any person who caused the emergency for the recovery of such money or cost, and for the purposes of this section, "municipality" includes a local board of a municipality, a county and a local services board.

* * *

APPENDIX 11
(Ref: Paragragh 1.4.3)

EXTRACTS

HEALTH PROTECTION AND PROMOTION ACT, 1983

* * *

13.—(1) A medical officer of health or a public health inspector, in the circumstances mentioned in subsection (2), by a written order may require a person to take or to refrain from taking any action that is specified in the order in respect of a health hazard. Order by M.O.H. or public health inspector re health hazard

(2) A medical officer of health or a public health inspector may make an order under this section where he is of the opinion, upon reasonable and probable grounds, Condition precedent to order

(a) that a health hazard exists in the health unit served by him; and

(b) that the requirements specified in the order are necessary in order to decrease the effect of or to eliminate the health hazard.

(3) In an order under this section, a medical officer of health or a public health inspector may specify the time or times when or the period or periods of time within which the person to whom the order is directed must comply with the order. Time

(4) An order under this section may include, but is not limited to, Idem

(a) requiring the vacating of premises;

(b) requiring the owner or occupier of premises to close the premises or a specific part of the premises;

(c) requiring the placarding of premises to give notice of an order requiring the closing of the premises;

(d) requiring the doing of work specified in the order in, on or about premises specified in the order;

(e) requiring the removal of anything that the order states is a health hazard from the premises or the environs of the premises specified in the order;

(f) requiring the cleaning or disinfecting, or both, of the premises or the thing specified in the order;

(g) requiring the destruction of the matter or thing specified in the order;

(h) prohibiting or regulating the manufacturing, processing, preparation, storage, handling, display, transportation, sale, offering for sale or distribution of any food or thing;

(i) prohibiting or regulating the use of any premises or thing.

Person directed

(5) An order under this section may be directed to a person,

(a) who owns or is the occupier of any premises but where an order is directed to the occupier, the person making the order shall deliver or cause the delivery of a copy of the order to the owner of the premises;

(b) who owns or is in charge of any substance, thing, plant or animal or any solid, liquid, gas or combination of any of them; or

(c) who is engaged in or administers an enterprise or activity,

in the health unit served by the medical officer of health or the public health inspector.

Reasons for order

(6) An order under this section is not effective unless the reasons for the order are set out in the order.

Oral order

(7) Where the delay necessary to put an order under this section in writing will or is likely to increase substantially the hazard to the health of any person, the medical officer of health or the public health inspector may make the order orally and subsection (6) does not apply to the order.

Description of person directed

(8) It is sufficient in an order under this section to direct the order to a person or persons described in the order, and an order under this section is not invalid by reason only of the fact that a person to whom the order is directed is not named in the order.

Directions by M.O.H.

14.—(1) A medical officer of health, in the circumstances specified in subsection (2), may give directions in accordance with subsection (3) to the persons whose services are engaged by or to agents of the board of health of the health unit served by the medical officer of health.

When M.O.H. may give directions

(2) A medical officer of health may give directions in accordance with subsection (3) where the medical officer of health is of the opinion, upon reasonable and probable grounds, that a

health hazard exists in the health unit and the person to whom an order is or would be directed under section 13,

(a) has refused to or is not complying with the order;

(b) is not likely to comply with the order promptly;

(c) cannot be readily identified or located and as a result the order would not be carried out promptly; or

(d) requests the assistance of the medical officer of health in eliminating or decreasing the effect of the health hazard.

Contents of directions

(3) Under this section, a medical officer of health may direct the persons whose services are engaged by or the agents of the board of health of the health unit served by the medical officer of health to take such action as is specified in the directions in respect of eliminating or decreasing the health hazard.

Idem

(4) Directions under this section may include, but are not limited to,

(a) authorizing and requiring the placarding of premises specified in the directions to give notice of the existence of a health hazard or of an order made under this Act, or both;

(b) requiring the doing of work specified in the directions in, on or about any premises;

(c) requiring the removal of anything that the directions state is a health hazard from premises or the environs of premises specified in the directions;

(d) requiring the detention of any matter or thing removed from any premises or the environs of any premises;

(e) requiring the cleaning or disinfecting, or both, of any premises or thing specified in the directions;

(f) requiring the destruction of any thing specified in the directions.

* * *

Seizure

19.—(1) A medical officer of health or a public health inspector who is of the opinion, upon reasonable and probable grounds, that a condition of any substance, thing, plant or animal other than man is a health hazard may seize or cause the seizure of the substance, thing, plant or animal.

Examination

(2) The medical officer of health or public health inspector shall detain the substance, thing, plant or animal pending such examination or investigation as is necessary in his opinion or as is requested by the owner or person from whom the substance, thing, plant or animal was seized, to determine the existence of the health hazard.

Return

(3) Where the examination or investigation indicates that a health hazard is not present, the medical officer of health or public health inspector shall release the substance, thing, plant or animal to the owner or person from whom it was seized.

Destruction

(4) Where the examination or investigation indicates that a health hazard is present, the medical officer of health or public health inspector shall destroy or dispose of the substance, thing, plant or animal or take such other action as will eliminate or decrease the health hazard.

Food

(5) Where food is seized under this section and the medical officer of health or public health inspector is of the opinion, upon reasonable and probable grounds, that the condition of the food is a health hazard, subsections (2) and (3) do not apply and he may destroy or dispose of the food or cause it to be destroyed or disposed of without further examination or investigation.

* * *

Where situation of risk to health

83. Where the Minister is of the opinion that a situation exists anywhere in Ontario that constitutes or may constitute a risk to the health of persons, the Minister may direct the Chief Medical Officer of Health to investigate the situation and to take such action as the Chief Medical Officer of Health considers appropriate to prevent, eliminate and decrease the risk to health caused by the situation.

Powers of Chief Medical Officer of Health

84.—(1) For the purposes of sections 82 and 83, the Chief Medical Officer of Health,

- (a) has, and may exercise anywhere in Ontario, the powers of a medical officer of health; and
- (b) may direct a person whose services are engaged by a board of health to do, anywhere in Ontario (whether within or outside the health unit served by the board of health), any act,
  - (i) that the person has power to do under this Act, or

(ii) that the medical officer of health for the health unit served by the board of health has authority to direct the person to do within the health unit.

Authority and duty of person directed to act

(2) Where the Chief Medical Officer of Health gives a direction under subsection (1) to a person whose services are engaged by a board of health,

(a) the person has authority to act, anywhere in Ontario (whether within or outside the health unit served by the board of health), to the same extent as if the direction had been given by the medical officer of health of the board of health and the act had been done in the health unit; and

(b) the person shall carry out the direction as soon as practicable.

* * *

APPENDIX 12
(Ref: Paragragh 1.4.3)

EXTRACTS

FARM PRODUCTS GRADES AND SALES ACT, 1937

1. In this Act. Interpretation

* * *

(*h*) "farm product" means such animals, animal products, Christmas trees, fruit, fruit products, grains, honey, maple products, seeds, tobacco, vegetables, vegetable products, wood or any class thereof and articles of food or drink manufactured or derived in whole or in part from any of those products as are designated in the regulations:

* * *

Inspection points 3.—(1) The Minister may designate places where farm products may be inspected and such highway inspection points as are considered necessary.

Idem (2) The Minister may, by order, require persons in charge of farm products that are being transported from an area designated by him to proceed to a designated highway inspection point and to remain there until the farm products are inspected. R.S.O. 1970, c. 161, s. 3.

* * *

8.—(1) For the purpose of enforcing this Act and the regulations, an inspector may, Powers of inspector

(*a*) enter any premises, other than a dwelling, that he has reason to believe is used for the producing, marketing or processing of any farm product and inspect the premises and any farm product, packages or equipment found therein;

(*b*) enter any vessel, boat, car, truck or other conveyance in which he has reason to believe there is any farm product and inspect the vessel, boat, car, truck or other conveyance and any farm product, packages or equipment found therein;

(*c*) obtain a sample of any farm product or package thereof at the expense of the owner for the purpose of making an inspection thereof; and

(*d*) demand the production or furnishing by the owner or custodian thereof of any books, records, documents or extracts therefrom relating to farm products.

* * *

Detention for purposes of inspection

7.—(1) For the purpose of inspecting any farm product or package, an inspector may detain it at the risk and expense of the owner and, after detaining it, the inspector shall forthwith notify the owner or person who had possession of it of the detention.

Inspection after detention

(2) Where an inspector detains any farm product or package under subsection (1), he shall, as soon as may be practicable, inspect the farm product or package and shall forthwith thereafter,

(*a*) release the farm product or package from detention; or

(*b*) detain the farm product or package under subsection (3).

Notice of detention

(3) Any farm product or package in respect of which an inspector believes on reasonable grounds an offence against this Act or the regulations has been committed, may be detained by him at the risk and expense of the owner, and the inspector shall forthwith thereafter notify the owner or the person who had possession thereof of the detention in writing

* * *

Prohibition against sale, etc

(7) No person shall, without approval in writing by an inspector, sell, offer for sale, move, ship or transport a farm product or package that is under detention.

Place where detained product to be kept

(8) Where any farm product is detained under subsection (1) or (3), the farm product shall be detained in the place where it was found by the inspector and shall, while under detention,

APPENDIX 13
(Ref: Paragragh 1.4.8)

EXTRACTS

WORKERS COMPENSATION ACT, 1984

* * *

Clause 1(1)

(z) "worker" includes a person who has entered into or is employed under a contract of service or apprenticeship, written or oral, express or implied, whether by way of manual labour or otherwise, and includes,

* * *

(vi) a person who assists in connection with an emergency that has been declared to exist by the head of council of a municipality or the Premier of Ontario,

* * *

Subsection 1

Deemed employer

(2) For the purpose of this Act,

* * *

(c) where the head of council of a municipality or the Premier of Ontario declares an emergency to exist as mentioned in subclause (1) (z) (vi), the municipality or the Crown in right of Ontario, as the case may be, shall be deemed to be the employer of the person,

* * *

APPENDIX 14
(Ref: Section 6.11)

NUCLEAR PLANNING GLOSSARY

Absorbed Dose: The amount of energy absorbed in the body, or in an organ or tissue of the body, due to exposure to ionizing radiation, divided by the respective mass of the body, organ or tissue. Expressed in terms of rad or gray.

Alerting: Informing people by means of an appropriate signal that a nuclear emergency has occurred or is about to occur (see also Notification).

Collective Dose (Equivalent): The sum of the individual doses received by all the persons exposed to a given source of radiation; it is also the product of the average dose to a group of exposed persons and the number of persons in the group. Generally expressed in person-rem or person-sievert.

Committed Dose (Equivalent): The radiation dose that will be received over a period of 50 years after a person takes in a quantity of radioactive material (by ingestion or inhalation). The dose is expressed in rem or sievert.

Containment: A series of physical barriers that exist between radioactive material contained in a nuclear facility and the environment. Containment usually refers only to the reactor and vacuum buildings, and integral systems such as dousing.

Contamination: The unwanted presence of radioactive material in water or air, or on the surfaces of structures, areas, objects or people following an accident at a nuclear facility.

Contiguous Zone: The zone immediately surrounding a nuclear facility which may require an increased level of emergency planning and preparedness compared with other areas more distant from the potential hazard (See Primary Zone and Secondary Zone, and see Figure 1, page 16).

Critical Group: A particular group among the population of a sector or area around a nuclear facility which, by virtue of age, sex or dietary habits, is expected to receive the highest dose from a release of radioactive material.

Crop Control: See Produce and Crop Control.

Crown Employee: A person employed in the service of the Crown or any agency of the Crown. (It does not include an employee of Ontario Hydro).

Declared Emergency: An emergency declared under the Emergency Plans Act, 1983, either by the Province or by a municipality.

Decontamination: Reduction or removal of radioactive contamination from a structure, area, object or person. Decontamination may be accomplished by measures such as washing, vacuuming, brushing or scraping.

Decontamination Centre: A facility set up to monitor contamination and, if necessary, decontaminate members of the public and their belongings.

Derived Emission Limits: Limits for radioactive emissions to air and water from a nuclear facility which ensure that, under normal operating conditions, Atomic Energy Control Board dose limits for members of the public are not exceeded by persons exposed to those emissions.

Designated Municipality: A municipality in the vicinity of a nuclear facility which has been designated under the Emergency Plans Act, 1983, as one that shall have a nuclear emergency plan (for list see Appendix 2).

Designated Nuclear Facility: A nuclear facility designated under the Emergency Plans Act, 1983, as one to which the Provincial Nuclear Emergency Plan applies (for list see Appendix 2).

Dose: A dose of radiation. Either dose equivalent, committed dose equivalent, effective dose equivalent, or committed effective dose equivalent, depending on the context.

Dose Equivalent: The absorbed dose multiplied by a quality factor to account for the different potential for injury of different types of radiation. Expressed in terms of rem or sievert. Quality factors are laid down in the Atomic Energy Control Regulations promulgated by the Atomic Energy Control Board.

Dose Projection: The calculation of projected dose (see Projected Dose).

Dose Rate: The amount of radiation dose which an individual would receive in a unit of time. In the context of this plan, the measurement units are multiples or submultiples of the rem or sievert per hour.

Dose Saving: Total dose is a function of the dose rate and the duration of exposure. If a protective measure is taken to reduce either of these factors, the total dose will be reduced. Dose saving is thus an estimate of the dose that will be saved in a specified segment of the affected population if a protective measure is taken.

Dosimeter: An instrument for measuring and registering total accumulated exposure to ionizing radiation.

Effective Dose (Equivalent): The sum of the weighted dose equivalents received by the organs and tissues of the body, where the weighted dose equivalent is the "dose equivalent" to an organ or tissue of the body, multiplied by the appropriate weighting factor laid down in the Atomic Energy Control Regulations promulgated by the Atomic Energy Control Board.

Emergency Workers: Persons who are required to remain in, or to enter, offsite areas affected or likely to be affected by radiation from an accident, and for whom special safety arrangements are required. They may include police, firefighters, ambulance and emergency social services workers, Canadian Armed Forces, Ontario Hydro and other essential personnel.

Emission: In the context of this plan, emission refers to release of radioactive material to the environment from a nuclear facility in the form of either an airborne or a liquid emission.

Evacuee Centre: A facility to provide shelter and food to a group of people who have been evacuated from an area as a result of a nuclear emergency.

Executive Authority: The Premier of Ontario or a Minister of the Crown designated by the Premier to exercise emergency powers under the Emergency Plans Act, 1983.

Exposure Control Centre: A facility set up to monitor and control radiation exposure of emergency workers.

Federal Nuclear Emergency Control Centre: The body set up under the Federal Nuclear Emergency Response Plan (see below) to control and co-ordinate the response to a nuclear emergency of the Government of Canada and its agencies.

Federal Nuclear Emergency Response Plan: The plan of the Government of Canada outlining the procedures to be followed by its departments and agencies in dealing with a nuclear emergency.

Field Monitoring: The assessment of the magnitude, type and extent of radiation in the environment during an emergency by such means as field surveys and field sampling.

Food Control: Measures taken to prevent the consumption of contaminated foodstuffs. Where appropriate, such control includes food storage to permit radionuclide decay, diversion of food to non-human, non-food chain use or disposal of unusable stocks.

Hostile Action : Any action, or threat of action, which could adversely affect, to a significant degree, the plant, materials, systems, operations or operators of a nuclear facility.

Host Municipality: The municipality assigned responsibility for the reception and care of people evacuated from their homes in a nuclear emergency.

Immediate Preventive Measures: Certain Ingestion Control measures which must be considered in the very early stages of a nuclear emergency, before the commencement of ingestion monitoring. (For list see section 6.3, page 43).

Ingestion Control: Emergency management operations where the main aim is to avoid or reduce the risk from ingestion of contaminated food and water.

Land Control: Control of the use of contaminated land for growing food products or animal feed.

Livestock Control: Quarantine of livestock in the affected area to prevent movement to other areas. Slaughter of such animals for food may be banned.

Local Board: Any school board, public utility commission, transportation commission, public library board, board of park management, local board of health, board of commissioners of police and any other board, commission, committee, body or local authority established or exercising any power or authority under any general or special Act with respect to any of the affairs or purposes, including school purposes, of a municipality or of two or more municipalities or portion thereof.

Milk Control: Preventing the consumption of locally produced milk in the area affected by a nuclear emergency, and its export outside the area until it has been monitored. Collection of contaminated milk, its diversion to other uses, or its destruction, may also be involved.

Municipal Control Group: A generic title for the body set up under a municipal nuclear emergency plan to direct and control municipal response activities during Phase 1 of a nuclear emergency. It may be a joint group set up by a number of small municipalities.

Notification: Conveying to a person, organization or population, by means of a message, warning of a nuclear emergency, including advice or direction on protective action, if required (see also Alerting).

Nuclear Emergency: An emergency involving a nuclear facility which poses an actual or potential radiation hazard to people and/or property offsite.

Nuclear Facility: A nuclear facility in the context of this plan is a nuclear reactor, a sub-critical nuclear reactor or a plant for the separation, processing, reprocessing or fabrication of fissionable substances from irradiated fuel. It also includes all land, buildings and equipment that are connected or associated with these reactors or plants.

Nuclear Facility Operator: The corporate body that controls the operations of a nuclear facility. Examples: Ontario Hydro, Atomic Energy of Canada Limited.

Offsite: Offsite refers to the area outside the boundary fence of a nuclear facility.

Onsite: Onsite means the area inside the boundary fence of a nuclear facility.

Pasture Control: Removing milk- and meat-producing animals from pasture and from access to open water sources, and supplying them with uncontaminated feed and water.

Plume: A cloud of airborne radioactive material that is transported in the direction of the prevailing wind from a nuclear facility. A plume results from a continuing release of radioactive gases or particles. (This term may also be used for waterborne radioactive material resulting from a liquid emission. Where the context does not make it clear, this will be referred to as a Waterborne Plume).

Plume Exposure Control: Emergency operations aimed at reducing or avoiding exposure to a plume or puff of radioactive material. Measures to deal with surface contamination and resuspension might also be included.

Primary Zone: The zone around a nuclear facility within which it would be prudent to plan and prepare for taking Plume Exposure Control measures, including evacuation. (The Primary Zone includes the inner Contiguous Zone.) See Figure 1, page 16.

Produce and Crop Control: Restrictions on the harvesting or processing of potentially or actually contaminated crops, vegetables and fruits. Measures include: embargoing export outside the affected area; storage to allow radionuclide decay; diversion to non-food chain use; destruction and disposal of contaminated produce.

Projected Dose: The highest committed effective dose equivalent, or committed dose equivalent to a specified organ or tissue, likely to be received through all applicable exposure pathways by the most exposed member of the critical group in the area for which the projection is being made. The projected dose would include any dose already received due to the emergency.

Protective Action: A generic term covering the various measures that can be taken to minimize the impact on people of a hazardous release of radioactive material from a nuclear facility. Examples: sheltering, evacuation.

Protective Action Levels (PALs): Projected dose levels which provide guidance on the need to take certain protective measures.

Puff: A plume of short duration. The distinction between a puff and a plume is a matter of time. The upper limit on the duration of a puff is one-half hour.

Radiation: Ionizing radiation produced by a radioactive substance or a nuclear facility.

Reception Centre: A location outside the Primary Zone through which evacuees have to pass to receive assistance, which would normally include registration, first aid, monitoring and decontamination, and direction to an evacuee centre. One reception centre would usually serve several evacuee centres.

Response Sectors: The Primary Zone is subdivided into Response Sectors to facilitate the planning and implementation of protective measures. See Figure 1, page 16.

Restoration: Operations to restore conditions to normal after a nuclear emergency.

Secondary Zone: The zone around a nuclear facility within which it would be prudent to plan and prepare for taking Ingestion Control measures. (The Secondary Zone includes the Primary and Contiguous Zones.) See Figure 1, page 16.

Selective Evacuation: The evacuation from a Response Sector of a specified group of people. These could include seriously ill patients in hospitals, bedridden residents of nursing homes, disabled residents.

Sheltering: A protective measure which uses the shielding properties of buildings and their potential for ventilation control to reduce the radiation dose to people inside.

Source Term: A generic term applied to the radioactive material released from a nuclear facility. It implies a knowledge of the quantity and type of material released as well as the timing and rate of its release. It could apply to an emission that was currently occurring, or one which had ended, or one which could take place in the future.

Special Group: A group for which special constraints arise in the application of a protective measure, such as intensive care patients in hospitals and institutions, bedridden patients in nursing homes, handicapped persons and prison inmates.

Special Media: Media covering the Primary Zone, or aimed at special groups, with which prior arrangements have been made to disseminate directions and news to the affected public during a nuclear emergency.

Thyroid Blocking: The reduction or prevention of uptake of radioiodine by the thyroid gland, which is accomplished by the intake of a stable iodine compound such as potassium iodide by people exposed or likely to be exposed to radioiodine.

Trans-border Nuclear Emergency: A nuclear emergency involving a nuclear facility or nuclear accident outside the borders of Ontario which might affect people and property in the Province.

Vulnerable Group: A group which, because it is more vulnerable to radiation, may require protective measures not considered necessary for the general population, such as pregnant women and, in some cases, children.

Water Control: Measures taken to avoid the contamination of drinking water supplies and sources, and to prevent or reduce the consumption of contaminated water.

APPENDIX 15

(Ref: Paragraph 6.10.4)

CONVERSION TABLE -- RADIOLOGICAL UNITS

BETWEEN OLD UNITS AND SYSTÈME INTERNATIONAL (SI) UNITS

From curie to becquerel

kilocurie (kCi) ≈ 37 terabecquerel (TBq)
curie (Ci) ≈ 37 gigabecquerel (GBq)
millicurie (mCi) ≈ 37 megabecquerel (MBq)
microcurie (μCi) ≈ 37 kilobecquerel (mBq)
nanocurie (nCi) ≈ 37 becquerel (Bq)
picocurie (pCi) ≈ 37 millibecquerel (mBq)

From becquerel to curie

1 terabecquerel (TBq) ≈ 27 curie (Ci)
1 gigabecquerel (GBq) ≈ 27 millicurie (mCi)
1 megabecquerel (MBq) ≈ 27 microcurie (μCi)
1 kilobecquerel (kBq) ≈ 27 nanocurie (nCi)
1 becquerel (Bq) ≈ 27 picocurie (pCi)

From rem to sievert

kilorem (krem) = 10 sievert (Sv)
rem (rem) = 10 millisievert (mSv)
millirem (mrem) = 10 microsievert (μSv)
microrem (μrem) = 10 nanosievert (nSv)

From sievert to rem

1 sievert (Sv) = 100 rem (rem)
1 millisievert (mSv) = 100 millirem (mrem)
1 microsievert (μSv) = 100 microrem (μrem)
1 nanosievert (nSv) = 100 nanorem (nrem)

From rad to gray

kilorad (krad) = 10 gray (Gy)
rad (rad) = 10 milligray (mGy)
millirad (mrad) = 10 microgray (μGy)
microrad (μrad) = 10 nanogray (nGy)

From gray to rad

1 gray (Gy) = 100 rad (rad)
1 milligray (mGy) = 100 millirad (mrad)
1 microgray (μGy) = 100 microrad (μrad)
1 nanogray (nGy) = 100 nanorad (nrad)

From roentgen to coulomb/kg

kiloroentgen (kR) ≈ 258 millicoulomb/kg (mC/kg)
roentgen (R) ≈ 258 microcoulomb/kg (μC/kg)
milliroentgen (mR) ≈ 258 nanocoulomb/kg (nC/kg)
microroentgen (μR) ≈ 258 picocoulomb/kg (pC/kg)

From coulomb/kg to roentgen

1 coulomb/kg (C/kg) ≈ 3876 roentgen (R)
1 millicoulomb/kg (mC/kg) ≈ 3876 milliroentgen (mR)
1 microcoulomb/kg (μC/kg) ≈ 3876 microroentgen (μR)
1 nanocoulomb/kg (nC/kg) ≈ 3876 nanoroentgen (nR)

Prefixes

tera (T)	x 10^{12}	pico (p)	x 10^{-12}
giga (G)	x 10^{9}	nano (n)	x 10^{-9}
mega (M)	x 10^{6}	micro (μ)	x 10^{-6}
kilo (k)	x 10^{3}	milli (m)	x 10^{-3}

PROVINCIAL NUCLEAR EMERGENCY PLAN

DISTRIBUTION LIST

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		I	II	III	IV	V	VI	VII	VIII
1. **Ministries**									
Agriculture and Food Admin. Coord., Quality & Standards Division	1-13	*	*	*	*	*	*	*	*
Cabinet Office Coord., Associate Secretary's Division	14	*	*	*	*	*	*	*	*
Community and Social Services Operational Support Branch	15-24	*	*	*	*	*	*	*	*
Consumer and Commercial Relations Chief Engineer, Pressure Vessels Safety Branch	25	*	*	*	*	*	*	*	*
Energy ADM, Policy & Planning Division	26	*	*	*	*	*	*	*	*
Environment Contingency Planning Office, Regional Ops Div.	27-35	*	*	*	*	*	*	*	*
Government Services Exec. Asst., Deputy Minister's Office	36	*	*	*	*	*	*	*	*
Health Sr. Manager, Emergency Care Programs	37-42	*	*	*	*	*	*	*	*
Housing Exec. Rep., Phase 2 Advisory Committee	43	*	*	*	*	*	*	*	*
Labour SEPO, Radiation Protection Service	44-49	*	*	*	*	*	*	*	*

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		I	II	III	IV	V	VI	VII	VIII
Ministries (continued)									
Municipal Affairs Exec. Rep., Phase 2 Advisory Committee	50	*	*	*	*	*	*	*	*
Natural Resources Coord. Emergency Mgt., Land & Waters Group	51-56	*	*	*	*	*	*	*	*
Solicitor General Emergency Planning Ontario	57-66	*	*	*	*	*	*	*	*
Transportation & Communications Highway Operations & Maint. Division	67-78	*	*	*	*	*	*	*	*
2. **Provincial Organizations**									
Ontario Provincial Police General Headquarters	79-88	*	*	*	*	*	*	*	*
Ontario Hydro Emergency Preparedness Section, RMEP	89-108	*	*	*	*	*	*	*	*
Red Cross Ontario Division	109	*	*	*	*	*	*	*	*
St. John Ambulance Ontario Council	110	*	*	*	*	*	*	*	*
COMSONT Manager	111	*	*	*	*	*	*	*	*

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3. **Canada-Federal/Provincial**									
Health & Welfare Canada									
Director, Emergency Services	112	*	*	*	*	*	*	*	*
Radiation Protection Bureau									
Director	113-115	*	*	*	*	*	*	*	*
Emergency Planning Canada									
Regional Director, Ontario	116-117	*	*	*	*	*	*	*	*
Atomic Energy Control Board									
Planning and Coordination Section	118	*	*	*	*	*	*	*	*
Atomic Energy of Canada Limited									
Security Officer, Corporate Head Office	119	*			*	*			
Chalk River Nuclear Labs	120-123	*			*	*			
Department of National Defence									
Central Region Ops. Det., Downsview	124-125	*	*	*	*	*	*	*	*
CFB, Petawawa	126	*			*	*			
Canadian Coast Guard									
Central Region Emergency Operations	127	*	*	*			*	*	*
New Brunswick									
Deputy Director, EMO	128	*	*	*	*	*	*	*	*
Quebec									
Director Operations, BPCQ	129	*	*	*	*	*	*	*	*

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4. **Emergency Management Organization**									
Provincial Operations Centre									
Head, Technical Group	130	*	*	*	*	*	*	*	*
Head, Technical Support Section	131	*	*	*	*	*	*	*	*
Head, IM Control Group	132	*	*	*	*	*	*	*	*
Director of Information	133	*	*	*	*	*	*	*	*
Operations Centre	134-143	*	*	*	*	*	*	*	*
Provincial Information Centre									
Manager	144	*	*	*	*	*	*	*	*
Head, Media Section	145	*	*	*	*	*	*	*	*
Information Centre	146-152	*	*	*	*	*	*	*	*
Coordinators, Local Information Centres									
Pickering	153	*	*						
Metro	154	*	*						
Bruce	155	*		*					
Rolphton	156	*			*				
CRNL	157	*				*			
Fermi-2	158	*					*		
Darlington	159	*						*	
Ingestion Monitoring Organization									
Sr. Emergency Planning Officer, MOL	160-162	*	*	*	*	*	*	*	*
Chairman, Technical Advisory Committee	163	*	*	*	*	*	*	*	*
Joint Traffic Control Centre									
Pickering	164	*	*						

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5. **Municipalities**									
Metropolitan Toronto									
Coordinator, Emergency Planning	165-189	*	*					* (2 copies)	
Durham Region									
Coordinator, Emergency Planning	190-204	*	*					*	
York Region									
Chief Administrative Officer	205	*	*					*	
Chief of Police	206	*	*						
Peel Region									
Chief Administrative Officer	207	*	*						
Victoria County									
C.A.O./Emergency Planning Official	208	*	*					*	
Northumberland County									
C.A.O./Emergency Planning Official	209	*	*					*	
Peterborough County									
C.A.O./Emergency Planning Official	210	*	*					*	
Bruce County									
Chief Administrative Officer	211	*		*					
Medical Officer of Health	212	*		*					
Director of Social Services	213	*		*					
Board of Education	214	*		*					
Bruce-Grey R.C.S.S.B	215	*		*					

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		PARTS OF PLAN							
Municipalities (continued)									
Bruce Township	216	*		*					
Kincardine Township	217	*		*					
Tiverton Village	218	*		*					
Kincardine Town									
Mayor	219	*		*					
Chief of Police	220	*		*					
Port Elgin Town									
Mayor	221	*		*					
Chief of Police	222	*		*					
Grey County									
C.A.O./Emergency Planning Official	223	*		*					
Huron County									
C.A.O./Emergency Planning Official	224	*		*					
Renfrew County									
Chief Administrative Officer	225	*			*	*			
Medical Officer of Health	226	*			*	*			
Board of Education	227	*			*	*			
R.C.S.S.B	228	*			*	*			
Red Cross	229	*			*	*			
Rolph, Buchanan, Wylie & McKay Township	230	*			*	*			
Head, Clara & Maria Township	231	*			*	*			

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Municipalities (continued)									
Chalk River Village	232	*			*	*			
Deep River Town	233	*			*	*			
Essex County									
Chief Administrative Officer	234	*					*		*
Medical Officer of Health	235	*					*		
Director of Social Services	236	*					*		
Planning Department	237	*					*		*
Board of Education	238	*					*		
R.C.S.S.B	239	*					*		
Amherstburg Town	240	*					*		
Anderdon Township	241	*					*		
Malden Township	242	*					*		
Harrow Town	243	*					*		
Sandwich West Township	244	*					*		
Windsor City									
Mayor	245	*					*		
Chief of Police	246	*					*		
Pelee Township	247	*					*		*
Prince Edward County									
C.A.O/Emergency Planning Official	248	*							*

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	Municipalities (continued)									
	Lennox & Addington County									
	C.A.O/Emergency Planning Official	249	*							*
	Frontenac County									
	C.A.O/Emergency Planning Official	250	*							*
	Kingston City									
	C.A.O/Emergency Planning Official	251	*							*
6.	**USA - Federal/State**									
	Federal Emergency Management Agency									
	Director, International Affairs	252	*	*	*			*	*	*
	Director, Region II	253	*	*					*	*
	Director, Region V	254	*		*			*		*
	Nuclear Regulatory Commission									
	Director, International Programs	255	*	*	*			*	*	*
	Director, Region I	256	*	*					*	*
	Director, Region III	257	*		*			*		*
	State of Michigan									
	Dept. of State Police	258	*		*			*		
	Detroit Edison	259	*					*		
	State of New York									
	Emergency Management Office	260	*	*					*	*
	State of Ohio									
	Disaster Services Agency	261	*							*
7.	**Reserve**	262-275	*	*	*	*	*	*	*	*